

MARINE REVIEW.

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No. 18.

Ore Sales and Freight Contracts.

Another buying movement in ore was started early this week, and although the Carnegie company has not yet made any purchases, other Pittsburgh concerns have partly provided for their wants during the coming year. It is now quite certain that between 3,500,000 and 4,000,000 tons of ore has been sold, but this includes, of course, the ore that is consumed by furnace companies having interests in mining properties. The first big transaction in lake freights was closed on Tuesday, when Pickands, Mather & Co., agents for the American Steel Barge Co., made arrangements with M. A. Hanna & Co. and Tod, Stambaugh & Co. to give the whalebacks the great bulk of ore that they will require for the coming season. Some other tonnage that has been regularly employed with M. A. Hanna & Co. was also placed, and the rates were \$1 to October 1 and \$1.05 for the season, contracts in the latter case involving one trip in November.

It may be taken for granted that this action on the part of Hanna & Co. and Pickands, Mather & Co., two of the largest concerns in the ore business, was for the purpose of establishing these rates for ships like those of the Minnesota Steamship Co., Mutual and Menominee transportation companies and other lines controlled by the ore dealers. This is further proven by the fact that Oglebay, Norton & Co. and other shippers have said to the owners of vessels regularly employed by them that they can have the same rates on quantities of ore in proportion to sales thus far made. In other words these rates are now established for boats of the ore companies and for such vessel owners as are not independent of ore connections.

On the other hand there has been no business done through brokers as yet, and the individual vessel owners are still claiming that they will hold out for \$1.10 as a season rate. This claim, which has been made for a long time past, is, of course, weakened by the big transactions just referred to, but it is nevertheless certain that the number of vessels taking chances on charters from trip to trip will be much greater than in the past seasons, unless further ore sales prompt an advance in season rates a little later on. Vessel owners are encouraged by the steady offers of grain at Duluth and Chicago. If this activity in the grain trade holds out for about a month, and if there is any improvement in the iron market in the meantime, the vessel owners who are asking for higher rates will certainly gain their point, as it is absolutely certain that every pound of ore sold on the \$4 basis will be covered by lake freight immediately, and shippers will not dally over a 5-cent advance in freights. But for the present the only contract rates that can be quoted are those noted above, \$1.05 for the season, and \$1.00 to October 1.

Non-Bessemer Ores of Lake Superior.

W. G. Pollock of the Pittsburgh & Lake Angeline Iron Co. is of the opinion that producers of non-Bessemer ores in the Lake Superior region are making a mistake in sacrificing their mines as they have been doing for two or three years past. They are simply exhausting the ore deposits, he says, without receiving anything in return, and many of the companies have done business at an actual loss. Each producer is trying to see how low he can sell so as to get the start of some other competitor, and the result is disastrous. The southern iron makers, Mr. Pollock says, are influencing this to a considerable degree. They have been sending pig iron into Detroit, and the railroads were hauling it to that place from Alabama for \$4 a ton. Upon this they were actually losing money but they were obtaining business from other freights in connection with the iron hauling that gave them a profit. The southern men are getting very tired of trying to make pig for nothing. It has been a losing venture, and Mr. Pollock thinks the time must be near at hand when they will be willing to change the present policy for one that will be more in keeping with legitimate business operations. He thinks it would be better for the interests associated with the mining of these ores if they were in fewer hands. Then the business could be regulated so as to prevent the present disastrous competition for a place in the market. As now practiced, it is simply a race for the survival of the fittest.

Officials of the Carnegie Steel Company now make no secret of their connection with the Pittsburgh, Shenango & Lake Erie Ry. Co. which controls ore docks and other terminal property at Conneaut. The railway company's alliance with the big steel company will relieve the management of a heavy financial load and result in an entrance to Pittsburgh over the Carnegie belt line. On the other hand the Carnegie company will have another advantage over competitors in lower handling and carrying charges on its ore from vessel to furnace.

Lake Erie-Ohio River Canals—A Government Report.

The river and harbor act of August, 1894, contained an appropriation of \$20,000 for survey of canal routes in Ohio connecting Lake Erie with the Ohio river. The report of the board of army engineers appointed to make this survey was submitted to congress, through the secretary of war, a month ago, but the first copies of it in print were distributed only a few days ago. It is a document of 120 pages accompanied by numerous maps and diagrams, and it probably contains more information regarding Ohio canals and the subject of enlarging them by lake connections than has ever before been collected in a single work. The board of army engineers in charge of the survey, as originally constituted, consisted of Gen. O. M. Poe, Col. Amos Stickney and Major Wm. L. Marshall, but upon the death of Gen. Poe, in October last, Major Wm. S. Stanton was appointed to fill the vacancy. These officers were, of course, well enough acquainted with all of the details of lake commerce to know that a canal of 7 feet draft from Lake Erie to the Ohio river would not prove successful commercially. But the duty devolving upon them was to prepare a report in accordance with the act of congress, and in this regard they have done well, as they have at least collected a great deal of information on the subject assigned to them. The cost of this information (\$20,000) seems high, however, and can only be tolerated in measures like the average river and harbor bill.

The act provided for a survey of the Miami and Erie canal, the Ohio canal and such branches thereof and such river and stream channels as may form available portions of a continuous canal connecting the waters of Lake Erie with the Ohio river through the state of Ohio, and a report as to the feasibility and advisability of improving and widening such canal to 70 feet at the water line, and deepening the same to 7 feet; also the construction of new locks not less than 150 feet in length and 21 feet in width, so as to provide capacity for vessels of at least 280 tons burden.

The board reported the following routes as available: First, eastern route, Cleveland to Marietta; second, central route, Sandusky bay to Portsmouth; third, western route, Toledo to Cincinnati. On all three routes the water supply is such that, by constructing suitable reservoirs and enlarging the capacities of existing state works, and readjusting the summit levels of the canals by lowering them so that the storage can be made available, it is practicable to construct along any or all of the natural routes named a canal of the dimensions specified that may be operated at its full capacity for 275 days of each year. The estimated cost of each waterway of the prescribed dimensions is: Eastern route, \$12,299,372; central route, including cost of feeder from Lewiston reservoir to the Scioto valley, \$18,118,165; western route, \$23,011,374.

The relative merits of the three routes are cited at great length in the report. Opinions from Alexander McDougall, General Manager Charles E. Wheeler, of the Cleveland Canal Boat Co., and others are also included, and there is a great mass of statistics bearing upon barge traffic in different parts of the country. But the board concludes that while it would be "feasible" to build a canal of the dimensions specified in the act, a waterway of such dimensions and capacity would, by inadequate depth in the canal and in the Ohio requiring a transshipment of freight, be so restricted in its benefits to interstate commerce that its construction, apart from an adequate improvement of the Ohio river, would not be "advisable." The board did not consider it a part of its duty to present any recommendation with regard to a canal of dimensions different from those prescribed in the act of congress, but the report covers the question of water supply and cost of construction for a canal having a uniform width of 85 feet and depth of 10 feet, which would admit the passage of vessels that might be considered of about the least practicable size for lake navigation.

Accompanying the report is an excellent map of Ohio and adjacent territory, showing existing abandoned and proposed canal routes between Lake Erie and the Ohio river.

For three months or more past the REVIEW has been publishing lists of captains and engineers of vessels owned in all parts of the lakes. The work is now complete and these lists, just as they appeared in the REVIEW, have been collected and printed in pamphlet form. The pamphlet contains the names of hundreds of captains and engineers, as well as the names and post office addresses of all the leading corporations and firms that control vessel property. These small books are offered for sale by the REVIEW and will be sent to any address upon receipt of \$1.

Babcock & Wilcox water tube boilers in combination with cylindrical boilers will be used in the cruiser Chicago, which is undergoing extensive alterations. This boiler will also be used in several of the torpedo boats.

Compound Marine Boilers.

Col. N. Soliani, director of naval construction in Italy, is prominent among the great naval authorities who are not of the opinion that water tube boilers are soon to replace entirely the old style of cylindrical boiler. A paper on "Compound Marine Boilers," which he presented at the last meeting of the Institution of Naval Architects, is attracting a great deal of attention. It deals with boilers having the heating surface made up both of water and fire tubes. After dealing with the prominent features of the modern marine cylindrical boiler, developed during an experience of two generations at sea, Col. Soliani says it is worthy of note that only in one country, France, are water tube boilers in general use both for merchant and war ships. The navies, now drifting to the water tube boiler, began really to feel the want of a change only when the cylindrical boilers appeared unsuitable to forced draft. He does not admit, however, that this unsuitableness exists, and points to the favorable results obtained with Serve tubes and with the Howden and Brown systems of combustion, by which the steaming power of marine cylindrical boilers per unit area of wetted heating surface has been brought up to limits which were lately deemed dangerous. But apart from these arrangements,

water spaces around the ordinary combustion chambers, and substituting for them water tubes, some of which would be properly arranged as a protecting screen in front of the tubes and tube plates.

"My meaning will perhaps be clearer by reference to Figures 1 to 4, in which the proposed alteration is sketched as applied both to single and double ended cylindrical boilers. Such boilers, if successful would be lighter, simpler, less sensitive to difference of temperature and to rapid changes of fire; while the screen of water tubes in front of the tube plates would protect to a great extent plates and tubes from damage under forced draft. In other words, these boilers would fulfill most of the requirements of modern steaming at sea, and exert, if adopted, a useful function in the present period of transition, which, by them, would become longer and smoother. The benefit would be mainly felt by the mercantile marine, on account of the larger interests involved, and because of its requirements, to which the ordinary marine boilers appear on the whole so well suited.

"Another advantage of the arrangement I propose would be the facility of admitting air under the back end of the fire grate, in a proper measure, to improve the efficiency of combustion, through a regulating

SINGLE ENDED

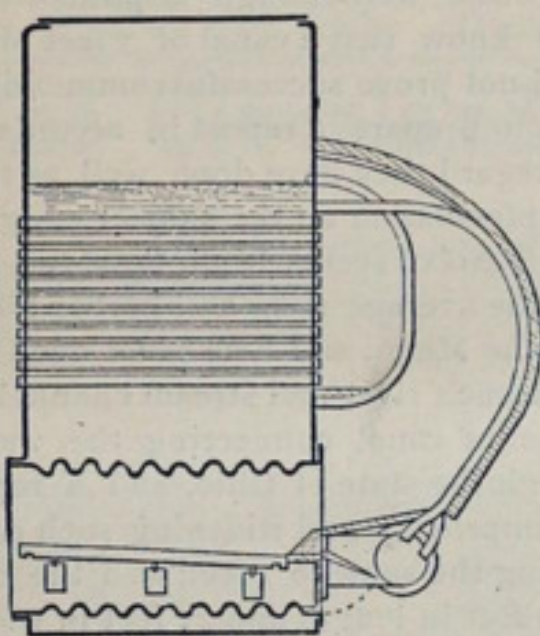


Fig. 1.—Longitudinal Vertical Section.

DOUBLE ENDED

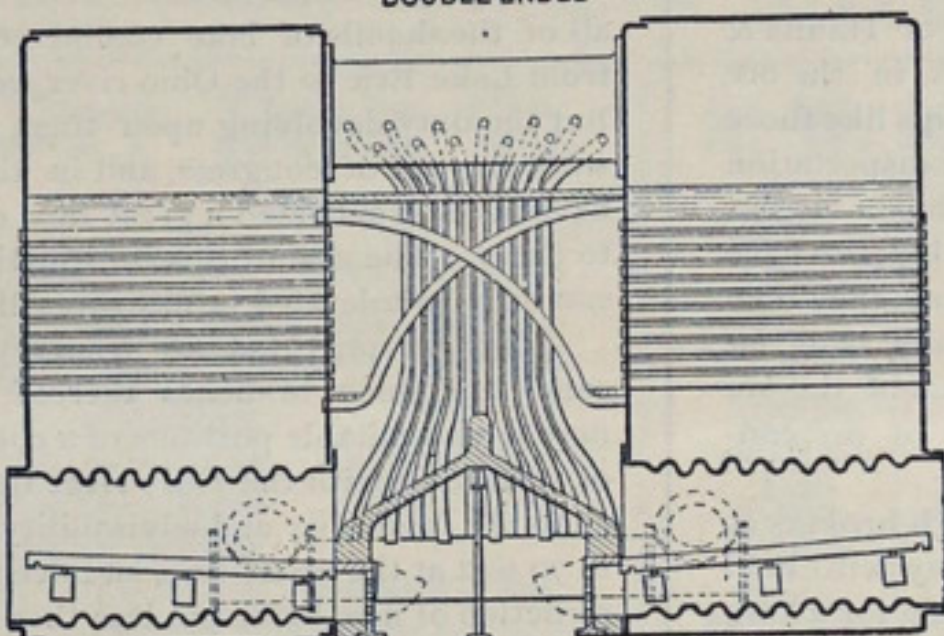


Fig. 3.—Longitudinal Vertical Section.

DOUBLE ENDED

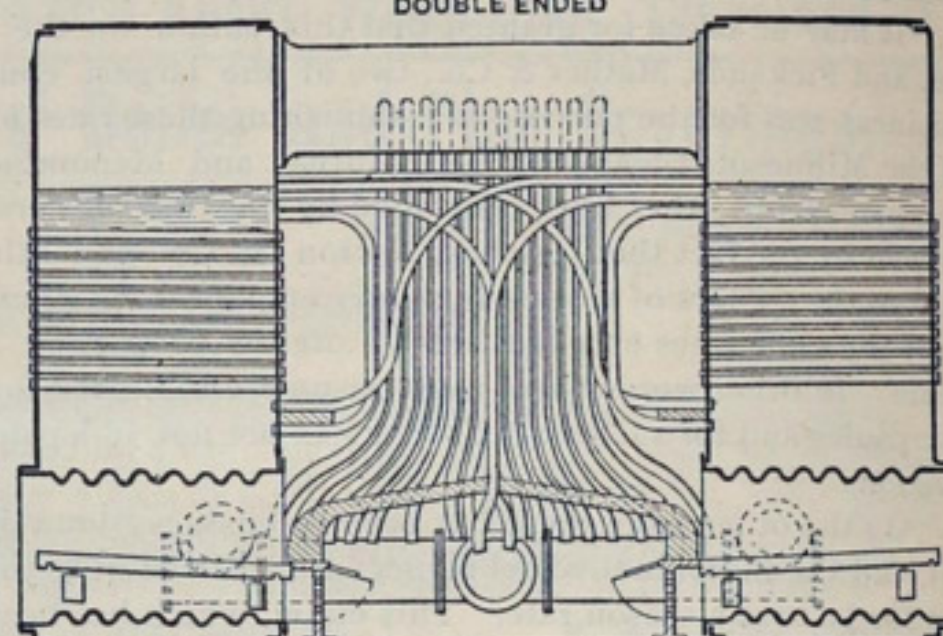


Fig. 5.—Longitudinal Vertical Section.

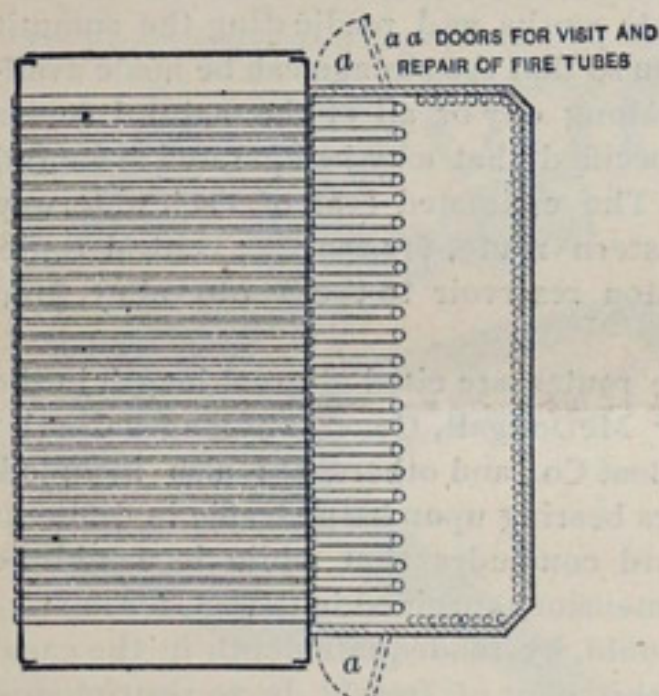


Fig. 2.—Horizontal Section Fig. 1.

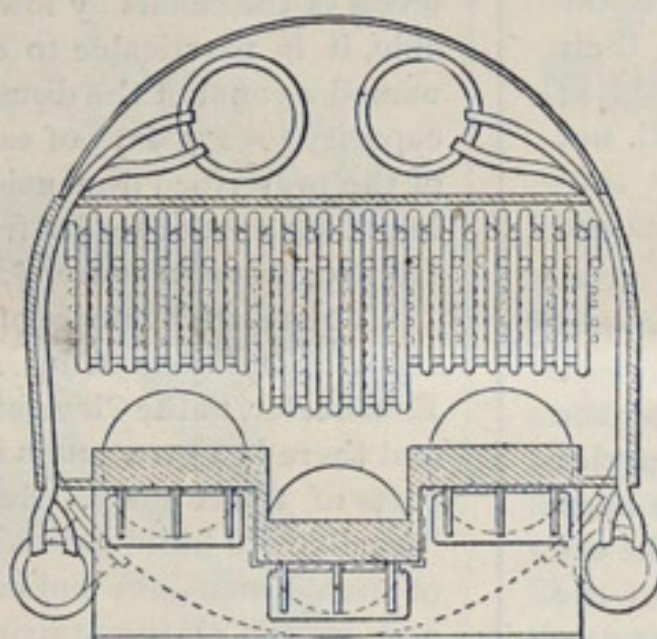


Fig. 4.—Transverse Vertical Section Fig. 3.

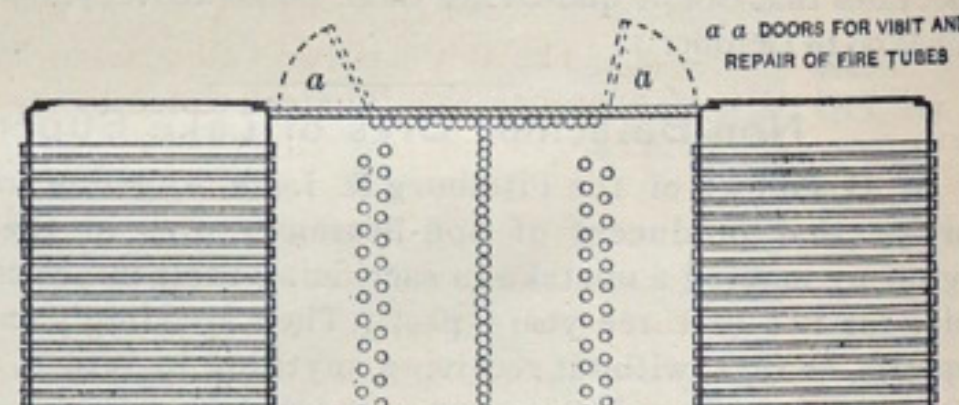


Fig. 6.—Horizontal Section Fig. 5.

COMPOUND MARINE BOILER.

which, if efficient in increasing the specific power of the boilers, have not improved them in respect to lightness and suitability for rapid steaming, there are, in the opinion of Col. Soliani, other stages for the development of the cylindrical boiler.

"Cylindrical boilers not only have, as yet," he says, "a great power of endurance in the mercantile competition, but there is still room on their side for further improvement, by which their vitality may be increased and the struggle prolonged, even for navy purposes, with advantage to the great interests involved. This new vitality may, I think, be conferred on cylindrical boilers by compounding them with water tubes in such a way as to make them partake, to a certain extent, of the good features of the water tube boilers, without detracting much from their own valuable characteristics. There are several compound boilers in the market. I do not wish to disparage any of these boilers, but they are not the kind of boiler I mean, viz., a marine cylindrical boiler compounded with water tubes to the extent that is necessary to give protection to the tubes and tube plates, and improve the boiler also in other respects (such as economy of weight, fitness to rapid changes of temperature, etc.), but without altering its main characters. Such a result may in my opinion, be achieved simply by doing away altogether with the

door fitted under the bridge and underneath the casing of water tubes forming the combustion chambers. My suggestions may be briefly summarized as follows, with a view to meet discussion:

"1. For swift vessels of small dimensions, designed for the use of torpedoes or special services, water tube boilers are a necessity.

"2. For certain classes of war ships of large size, water tube boilers are distinctly advantageous.

"3. For mercantile purposes and many classes of war ships, the water tube boilers are not yet perfectly suitable, and the cylindrical type of marine boiler is still to be preferred, and its continued employment is probable for some considerable time.

"4. There is a possibility of retaining the most valuable characteristics of the cylindrical type, while securing increased efficiency and fitness to meet the exigencies of modern steaming, by means of arrangements of water tubes somewhat of the character illustrated by figures 1 to 6.

Lieut. J. B. Cavanaugh of Detroit, who is in charge of the 20-foot channel work, is of the opinion that within a week or ten days the entire width of 800 feet in the channel at the foot of Lake St. Clair will be completed to 20 feet.

Rockefeller Ships.

DESCRIPTION OF VESSELS OF THIS FLEET BUILDING IN DIFFERENT YARDS,
WITH MIDSHIP SECTIONAL DRAWINGS.

As the twelve steel ships—seven steamers and five barges—now under construction for Mr. John D. Rockefeller are being built in six different yards around the lakes, it is the intention of the REVIEW to publish midship sectional drawings of all of them, thus showing in detail the methods of construction adopted by different builders. Full descriptions of the different vessels and machinery will be printed also, and with this information at hand, it may be possible in the future to make some interesting comparisons. It is hardly necessary to publish longitudinal sections or deck plans of the ships. These would show only the regular style of lake freight carrier with long open deck and houses at either end. The great wide cargo hatches, too, are characteristic of all lake vessels, although in these 400-foot ships the number of hatches is usually twelve, as against eight or nine in vessels built two or three years ago.

The first of the ships to go into commission is the steamer Sir Henry Bessemer, which will be launched by the Globe Iron Works Co., Cleveland, on Saturday, May 9. A midship section of this steamer will be found on the following page. This drawing as well as the description will also serve for the Sir Wm. Siemens, a ship that is a duplicate in every particular, and which is being built by the same company. The Sir Wm. Siemens is to be finished July 15. Dimensions of the Sir Henry Bessemer are as follows:

Length over all.....	432 ft.
Length between perpendiculars.....	412 ft.
Moulded beam.....	48 ft.
Moulded depth.....	28 ft.
From tip of keel to tip of sheer strake.....	28 ft. 6¾ in.
Depth of water ballast tank.....	5 ft.

The steamer has main deck beams but no laid deck, except at the forward and after ends; also a forecastle deck forward, and one steel deck-house forward, as well as a steel pilot house. She has also a steel deck-house on the spar deck aft, with galley and dining rooms on main deck aft. Accommodations for such of the crew as are not housed in the after deck house are provided in the forecastle. Engines and boilers are placed aft, between decks, the boilers athwartships, with fire room between them. The boiler house is of steel, and the coal bunker, located between decks, next forward of the boilers, is also of steel, carried up to the height of the boiler and deck house aft.

The double bottom, which is 5 feet deep from collision to engine bulk-heads, is divided by center keelsons and solid floors into eight compartments, for water ballast, and is built on the cellular system, solid longitudinals extending from the bottom plating to the tank top, continuous fore and aft. The vessel's hold is divided into four compartments by three screen bulkheads, extending to the spar deck. The spar deck is of steel complete, without wood covering except inside the houses and on the forecastle deck. The ship has two pole masts.

All plating is of open-hearth mild steel, tested to the following specifications: Tensile strength not less than 54,000 not more than 62,000 pounds per square inch. Limit of phosphorus not to exceed .08; elongation to be not less than 24 per cent. in eight inches and radiation to be not less than 45 per cent. Reports of tests to be furnished with invoices and plates not to be run over or under theoretical weight more than 2½ per cent. All shapes that are furnace shaped also of open hearth steel. All other shapes of Bessemer steel or open hearth steel as desired by the builder. Rivets of the best open hearth steel, the limit of phosphorus to be .06, limit of sulphur .06 and tensile strength not less than 52,000 nor more than 60,000 pounds per square inch; or, at the option of the builders, first-class quality of iron rivet material, of not less than 50,000 tensile strength per square inch. Materials to be tested at makers' works to these requirements by a disinterested party to represent both steel maker and ship builder, and to be appointed by the ship builder; provided that in case of angles, channels, beams and Z bars, the certified reports of tests made at the laboratory of the Pencoyd Iron Works will be accepted by the owner.

Engines are of the vertical triple expansion type, having cylinders 25, 41 and 66 inches diameter with a common stroke of 42 inches. Thickness of metal for the high pressure cylinder is 1¾ inches, intermediate pressure 1½ inches and low pressure 1¾ inches. The cylinders are, of course, inverted, and are supported by cast iron columns of rectangular cross section at back and front of engine. The bed plate is of box form and of cast iron 21 feet 5 inches long and 11 feet in width. The high pressure cylinder is operated by a valve of the piston type, while the valves of the intermediate and low pressure cylinders are double ported slide valves. The valve gear is the usual link motion, with two eccentrics, and reversing of the engine is accomplished by means of an independent steam reversing engine attached to the housings at the front. The pistons are of the usual box form, each being fitted with spring rings. Piston rods are made of the best steel and are 5¾ inches diameter. The

connecting and eccentric rods are of wrought iron. The condenser and air pump are placed at the back of the engine, the latter being worked from the crosshead of the intermediate cylinder.

Boilers are of the Scotch type, four in number, each 11 feet 3 inches mean diameter by about 11 feet 11½ inches long. Each boiler has three furnaces of 36 inches inside diameter, and the total heating surface is about 6,300 square feet. Boilers are allowed a working pressure of 175 pounds of steam per square inch. The propeller is of 14 feet diameter and 16 feet pitch. The ship has one steam capstan aft and two amidship, and a steam capstan windlass forward. A complete electric lighting outfit is furnished by the General Electric Co.

Business Success of a Buffalo Stevedore.

A good portrait of Wm. J. Connors of Buffalo is presented herewith. The REVIEW has for several weeks past been trying to obtain the photograph from which this engraving was made, and the correspondent who sent it suggests that "from the time it has taken to get the photograph out of Mr. Connors it is evident that he has no towering vanity in the matter of public attention." And yet W. J. Connors, who was, not many years ago, employed on the Buffalo docks as a stevedore, has reason to take to himself a few vain offerings, on account of the success that at-



W. J. CONNORS, BUFFALO, N. Y.

tends everything he undertakes. As a contractor employing stevedores in great numbers on the package-freight docks of Buffalo, he has probably made more money, and has been more successful with his employers and with the men under his charge, than anyone who has ever been engaged in similar work in this country. His success as a freight handler in Buffalo attracted attention in other places, including Chicago, Milwaukee and Gladstone, where he organized dock forces without any friction among the men. In Chicago and Milwaukee especially he stepped in some time ago and quickly stopped fighting on the docks without force or legal assistance, and in such a manner that the disturbances of previous years are not now heard of in these places.

Mr. Connors' attention now is devoted largely to building up a big patronage and influence for the Buffalo Enquirer, an evening newspaper in which he became interested recently and of which he is now practically the sole proprietor. A new building has been secured for the Enquirer and a large amount of money expended for a new press and other improvements, with a view to making it an all-round newspaper of the first-class, devoting special attention to lake marine news. In addition to looking after these enterprises the stevedore of former days is a director in two Buffalo banks, has large real estate interests and is having built at the works of the Union Dry Dock Co., Buffalo, a steel steam yacht that is to cost about \$60,000.

Captain George A. Zinn, corps of engineers, U. S. A., gives notice that the light-ship at the south end of the unfinished breakwater, Milwaukee bay, has been replaced at the expense of the engineer department.

Ship Yard Matters.

A Detroit correspondent says: "Within a fortnight half a dozen vessels have been docked by the Detroit Dry Dock Co. The steamer Elfin-Mere, barge Toledo and whaleback 104 were among them. The whaleback, which was damaged by collision with one of the Minch steamers, had simply a small plate, 3 by 4 feet, tapped on over a damaged plate of larger dimensions. At the Dry Dock Engine Works some important alterations in machinery are being made in the Bradley steamer Ranney, which is also being fitted with Howden hot draft apparatus. Her old boiler has been taken out and a new one of the Scotch type, which will have the Howden appliances, is ready to be placed aboard. The rebuilt steamer Fayette Brown has been floated from the Springwells dock, where she has been all winter, and in the few days that this plant has been given up to general repair work, three steamers, the Fessenden, State of Michigan and Wyandotte, have all been docked for minor repairs. S. F. Hodge & Co. have also been busy on machinery repairs, including extensive jobs on the Gettysburg and Geo. Farwell. The schooner Peshtigo, which has been rebuilt and converted into a steamer, left Hodge's works on Saturday last for Lake Superior. At Wyandotte a force of about 900 men is being worked to the utmost on the four freight steamers that are under construction, but even with this great rush the management of the ship yard did not discourage the desire of the workmen to offer sympathy to Assistant Superintendent Crossweller when his family was visited by death a few days ago. The assistant superintendent lost a daughter, an estimable young lady of seventeen years. The works were closed down at noon on the day of the funeral and the men followed the remains to the grave."

A slight departure from the regulation style of rounded deck in the whalebacks has been made in the steamer Franklin Rockefeller, which was launched at West Superior on Saturday last. The deck is flatter and the sides straighter than any of the other whalebacks. This is the thirty-seventh whaleback ship now afloat. The thirty-eighth vessel, a consort for this steamer, will be launched in a couple of weeks. Four of the vessels are on the Atlantic coast and one, the City of Everett, on the Pacific. The others are all on the lakes. The steamer just launched has eleven center line hatches, each 12 by 8 feet, and ten side hatches on the port side, each 6 by 4 feet. This arrangement will permit of twenty-one ore spouts being lowered into the vessel when loading. The Rockefeller is 382 feet long, 45 feet beam and 26 feet deep. Her triple expansion engines, as well as three Scotch boilers, were built by the Cleveland Ship Building Co. The engines have cylinders of 23, 38 and 63 inches diameter by 40 inches stroke, and the boilers are 12 feet in diameter by 13 feet long, each having three 38 inch furnaces, and capable of withstanding 175 pounds working steam pressure. The propeller is 13 feet 6 inches in diameter and 16 feet pitch. Alike to all of the other modern whalebacks, this steamer is fitted with a complete electrical plant for lighting purposes and has steam windlass, steam capstans, etc.

On account of uncertainty regarding time of delivery of the different Rockefeller ships, names for them have not all been assigned as yet, but it has been decided to give the names Sir Henry Bessemer and Sir Wm. Siemens to the two steamers that are being built at the Globe works, Cleveland, while the two steamers that are being built by the Detroit Dry Dock Co. will be named Sir Wm. Fairbairn and Robert Fulton. The steamer under construction at the American Steel Barge Co's. works will be named John Ericsson.

The tonnage of the mutual line steamer Coralia, recently built by the Globe Iron Works Co., Cleveland, and which will leave Saturday on her first trip for ore from Escanaba, is 4,330.82 tons gross and 3,351.43 net. Her official number 127,129. The Coralia will very probably take a big cargo of ore out of Escanaba for Ashtabula, as she is 432 feet over all. Tonnage of the steel schooner Geo. E. Hartnell, just completed at South Chicago, is 3,265.50 gross and 3,154.70 net.

The aggregate value of new ships being built by the Detroit Dry Dock Co. is about \$1,252,000. This is allowing \$360,000 for the side-wheeler City of Buffalo, \$256,000 each for the two Rockefeller ships, \$250,000 for the Wolverine company's steamer and \$130,000 for the steel lumber carrier that is being built for C. R. Jones and others of Cleveland. About 1,300 men are employed in the various departments of the dry dock company's works.

The wooden schooner building at Abram Smith & Son's yard, Algonac, Mich., will be launched and ready for service about May 15. She will be named Vinland and will tow behind the Viking. This vessel is 210 feet keel, 37 feet beam and 14 feet 2 inches depth, and is of white oak entire. She will be schooner rigged and will have a steam windlass and capstan, as well as a deck hoist and two 8-inch pumps.

If Senator Frye's amendment to the sundry civil appropriation is carried in the final proceedings, that measure will contain appropriations for two revenue cutters for the lakes, which will cost about \$200,000 each and which will be similar to the steamer now building in Cleveland. Bids on these vessels would be called for about the time of getting over the present rush in lake yards.

Recent Publications.

As an addition to their series of practical handbooks, Spon & Chamberlain, No. 12 Cortlandt street, New York, have issued a translation of G. Lieckfeld's little book on the care and management of gas engines. A chapter on oil engines has been added by G. Richmond, who made the translation. In the limits allowed it has only been possible to refer to the Otto gas engine and the Hornsby-Akroyd oil engine. The book sells for \$1.

We have received through the Burrows Bros. Co., Cleveland, a copy of another work in the series of royal navy handbooks edited by Commander C. N. Robinson, R. N. Its title is "Naval Administration" and it deals with the constitution, character and functions of the British board of admiralty and of the civil departments under its supervision. Admiral Sir Vesey Hamilton, late first sea lord of the admiralty, is the author. McMillan & Co., New York, are the publishers.

"Refrigerating Machinery," containing the general principles of refrigerating and ice making machinery, by George Richmond, M. E., will be mailed free on receipt of 20 cents in stamps. American Engineering Publishing Company, 333 Adams street, Brooklyn, N. Y.

No Free Charts.

Some vessel owners and masters are of the opinion that the government still furnishes to new vessels a full set of charts. This practice has been discontinued, as noted in the following letter from the United States engineer office from which the charts are issued in Detroit:

Editor MARINE REVIEW: Your letter of the 27th inst. in reference to issue of charts to new vessels has been received. Charts are issued free of cost only for the official use of officers in the service of the United States. To all other persons they are sold at the actual cost of paper and printing; therefore, the only way in which a new vessel leaving a ship yard can obtain a set of charts is by purchase.

United States Engineer office, J. B. CAVANAUGH,
Detroit, Mich., April 28, 1895. Second Lieut., Corps of Eng. U.S.A.

Mr. H. E. Schmuck of Springfield, Mass., is interested in lake vessel properly and is a careful reader of all information that is printed regarding lake shipping. His requests to the REVIEW for information regarding new ships, carrying charges, operating expenses, etc., would indicate that he is better posted generally on shipping matters here than a great many vessel owners who are on the ground, but who do not go into details as he does. A recent communication from Mr. Schmuck orders a copy of the year book, which the REVIEW is to issue shortly, and also the complete list of captains and engineers published a few days ago. His estimate of the value of printed matter sent out from this office may be judged from the following note in his last letter: "I will give you a standing order. Whenever you get out or publish any book or paper of any kind, which will give me any information on lake matters, please send me a copy without awaiting instructions."

Now that the government is about to place more large orders for torpedo boats, the Herreshoffs of Bristol, R. I., are again making offers on boats of high speed. They offer to build boats of thirty knots speed for \$215,000 each. The Herreshoffs say that they would like to build for the navy two or more boats of the highest practicable speed, not to exceed 225 tons displacement, and a speed of at least thirty knots. To enable them to realize this speed they say that it would be imperative to use the highest quality of material obtainable, and to employ the greatest skill in manufacture. They are confident that by using nickel steel they would be able to save sufficiently in weight and gain in strength to obtain this result; but this only can be done by considerably increasing the cost of material and labor over that necessary for the torpedo boats hitherto built in this country.

Mr. H. F. J. Porter of Chicago, western representative of the Bethlehem Iron Co., will read a paper on hollow steel forgings at the meeting of the American Society of Mechanical Engineers, to be held in St. Louis, May 19. He has also prepared an article for Cassier's magazine, which will appear shortly and which will treat of steel forgings. Mr. Porter is specially interested in the matter of securing for his company an increase of business among ship and engine builders on the lakes, and he is doing a good deal of missionary work with this end in view. With the aid of a number of lantern slides he will, at an early date, present the subject in an address to Chicago underwriters. He proposes also to make arrangements for similar addresses during the coming winter before the several associations of marine engineers in leading lake cities.

The chart of distances between lake ports, which was recently published by the hydrographic office, is the only reliable distance chart in existence. Distances are in statute miles. This chart is especially serviceable in the offices of vessel owners where book records of miles run, and costs of various supplies per ton per mile are kept. It sells at 50 cents and may be had from the MARINE REVIEW, Perry-Payne building, Cleveland.



DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

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The books of the United States treasury department on June 30, 1895, contained the names of 3,342 vessels, of 1,241,459.14 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1894, was 359 and their aggregate gross tonnage 634,467.84; the number of vessels of this class owned in all other parts of the country on the same date was 316 and their tonnage 642,642.50, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1895, was as follows:

Class.	Number.	Gross Tonnage.
Steam vessels.....	1,755	857,735.00
Sailing vessels.....	1,100	300,642.00
Unrigged.....	487	83,082.00
Total.....	3,342	1,241,459.00

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30,	Number.	Net Tonnage.
1891.....	204	111,856.45
" " " 1892.....	169	45,168.98
" " " 1893.....	175	99,271.24
" " " 1894.....	106	41,984.61
" " " 1895.....	93	36,353.00
Total.....	747	334,634.28

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.
(From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			Suez Canal.		
	1895.*	1894.	1893.	1895.	1894.	1893.
No. vessel pass'ges	17,956	14,491	12,008	3,434	3,352	3,341
T'n'ge, net registd	16,806,781	13,110,366	9,849,754	8,448,383	8,039,175	7,659,068
Days of Navigat'n	231	234	219	365	365	365

* 1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about 1/2 per cent. of the whole, but largely in American vessels.

AT NO TIME in the past has there been a more earnest movement in Cleveland in the matter of harbor improvements than there is at present. The passage of an act by the state legislature permitting the city to spend \$500,000 at once for straightening and widening the river has created a general interest in harbor matters, and a maritime board within the chamber of commerce promises to be one of the most important branches of that organization. The first docks to be erected within the breakwater enclosures are now nearing completion, and the success of the undertaking is a clear illustration of the great advantage of lake-front docks and slips. This first slip is just east of the east pier within the new arm of the breakwater. The Pennsylvania Co. is constructing and will own the slip and docks, together with the railway terminals, but the equipment is to be owned by the Cuddy-Mullen Co. and the entire plant will be operated by that company. A visit, a few days ago, of members of the chamber of commerce and several vessel owners to this plant has been the means of creating great enthusiasm on the subject of lake-front docks. The matter has now reached a point where something will certainly be done to overcome the difficulties regarding land titles, which have prevented the building of docks within the western breakwater enclosure.

The Cuddy-Mullen docks are those on which a McMyler coal dumping machine is being erected, and which are also to be fitted for accommodation of the Northern Steamship Co's. passenger ships. The progress made with these docks is wonderful, and as an initial enterprise on the lake front the whole project is worthy of commendation. A slip 150 feet wide, by 600 feet deep is already surrounded by a dock structure and the car dumping machine is approaching completion. The entire dock on the west side of the slip is devoted to the machine and track approaches, and this side will, of course, be entirely used for the shipment of cargo coal. On the east dock everything is now about ready for the erection of offices and dock houses to be used in connection with the passenger boats. On this side also work has been started on a series of pockets that are to be used for the rapid fueling of the passenger steamers and also for general fueling purposes. It is expected that the whole plant will be completed early in June. This enterprise will certainly be followed by other lake

front docks, and the building of such docks will solve the question of harbor facilities on Lake Erie to meet the 20-foot channel project of the lakes.

THE UNITED STATES light-house service is under the direction of a board that has accomplished more—with ample funds, of course—than any institution of its kind in the country. But like a great many other branches of the government this board, made up of army and navy officers, does not move with the rapidity that characterizes ordinary business enterprise. Its methods are very thorough, but they have often been found too slow to meet the requirements of lake commerce. It is evident that this same opinion prevails elsewhere, as indicated by an important amendment made to the sundry civil appropriation bill in the United States senate this week. Seven years ago, congress authorized the construction of a light-house on Diamond shoal, North Carolina, at a cost of \$500,000 and appropriated \$200,000 for beginning the work. This shoal is near the entrance to Chesapeake bay, a point where the commerce is almost as important as that of New York harbor. The shoal is the most dangerous on the Atlantic coast. Great difficulty has been found in erecting a light-house there, on account of shifting sands, bad weather at all seasons and other disadvantages. During all these seven years the newspapers have contained accounts of experiments made by the light-house board and efforts made by contractors to erect the light. But the number of wrecks has increased and the shipping interests have grown tired of waiting for the light. Senator Gorman of Maryland has finally taken the matter up, and in opposition to the light-house board he succeeded in having passed in the senate a few days ago an amendment to the civil sundry bill setting aside \$80,000 of the \$200,000 already appropriated for the construction of a light-ship to be located at this point. It has been claimed that there may be difficulty in maintaining a light-ship at Diamond shoal, but the interests that have waited so long for some kind of an aid to navigation say that if the ship can not be maintained there will be no loss on account of its construction, as it can be used at some other point.

HERE IS an opinion expressed by an ore dealer, who is also a vessel owner, and whose vessel interests are about equal to his interests in ore: "If vessel owners now accept less than \$1.10 on season ore contracts from the head of Lake Superior they must charge the results to their own inability to hold out for a short period on a rate that is due them in accordance with prices of ore and the reduction in the carrying capacity of vessels due to low water. Other matters have engaged the attention of the Carnegie company, and as usual Pittsburg furnace men generally are awaiting the action of the Carnegie people. This year, I think, the smaller concerns in the Pittsburg district are making a mistake in following this course. They have made the same mistake in the past. The Carnegie company probably has enough ore to run its furnaces into June but not, as has been intimated, till August. From present indications it would certainly seem that all that is necessary on the part of the vessel owners is to continue in the course they have been pursuing, that of running on wild charters, and there will be ore enough to go around at the rate for which they have been holding out."

VESSEL owners have this year presented a solid front in demanding fair rates of freight on season ore contracts, and there is greater reason now than ever to expect that they will be successful. Thus far they are to be congratulated. They have held no conferences and have made no attempt at combinations in support of their demand for \$1.10 on ore from the head of Lake Superior. As individuals they advanced the opinion some time ago that they could not consistently accept less than \$1.10 as a Lake Superior rate for the season, and they have stuck to that figure, notwithstanding an early opening of navigation and a general movement of all vessels on wild charters. And this, too, in opposition to light sales of ore thus far. But conditions even during the first two weeks of navigation are drifting in their favor. Enough grain has shown up at Chicago and Duluth to cause a slight advance in Chicago rates, and to provide cargoes at the head of the lakes at a figure that is a little better than dollar ore.

IN a hearing before the house committee on commerce, a few days ago, Col. Wm. Ludlow, chairman of the Nicaragua canal commission, said that the commission spent three months on the isthmus, and he was certain that they were the only engineers who had ever been over the entire canal route. The entire board concurred in the opinion, he said, that the canal would be practicable, and while he did not think the canal could be built for \$125,000,000 he thought \$150,000,000 would cover the cost. Col. Ludlow was not inclined to answer a question from one of the members of the committee as to whether the canal would be a source of naval weakness, but he said if it was desired to protect the canal it would require some naval force at both ends.

AT the close of the last fiscal year the U. S. light-house establishment embraced 251 stations, 184 being on the Atlantic, fifty-three on the lakes, thirteen on the Pacific, and one at the falls of the Ohio, Louisville, Ky.

Search Lights on Lake Ships.

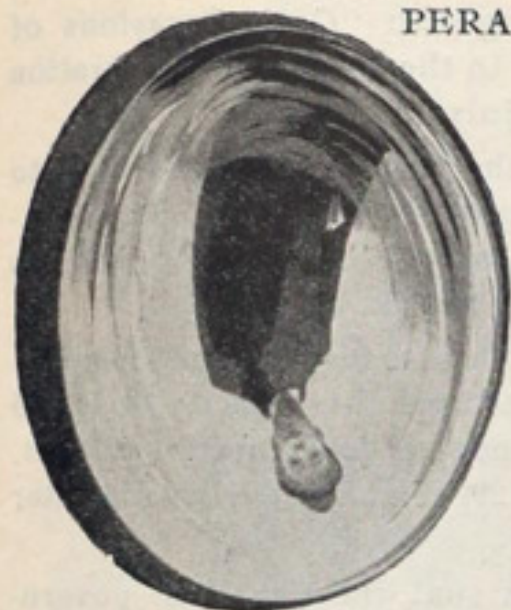


FIG. 4.

absorbs nearly all the light, it cannot be built for high power as it soon rusts away. In the new Rushmore projector there is mounted in the

PERATIONS of search lights are always interesting, especially when they are used aboard ships. The Rushmore Dynamo Works of Jersey City, N. J., has for years engaged in the manufacture of search lights and marine electrical equipment and a large number of their lights are to be found on lake steamers. This works has in the last year brought out a complete line of high-power lens mirror projectors for every class of service. In the common so-called search light there is an ordinary locomotive head light reflector fitted with an arc lamp in place of the oil wick, and while this reflector

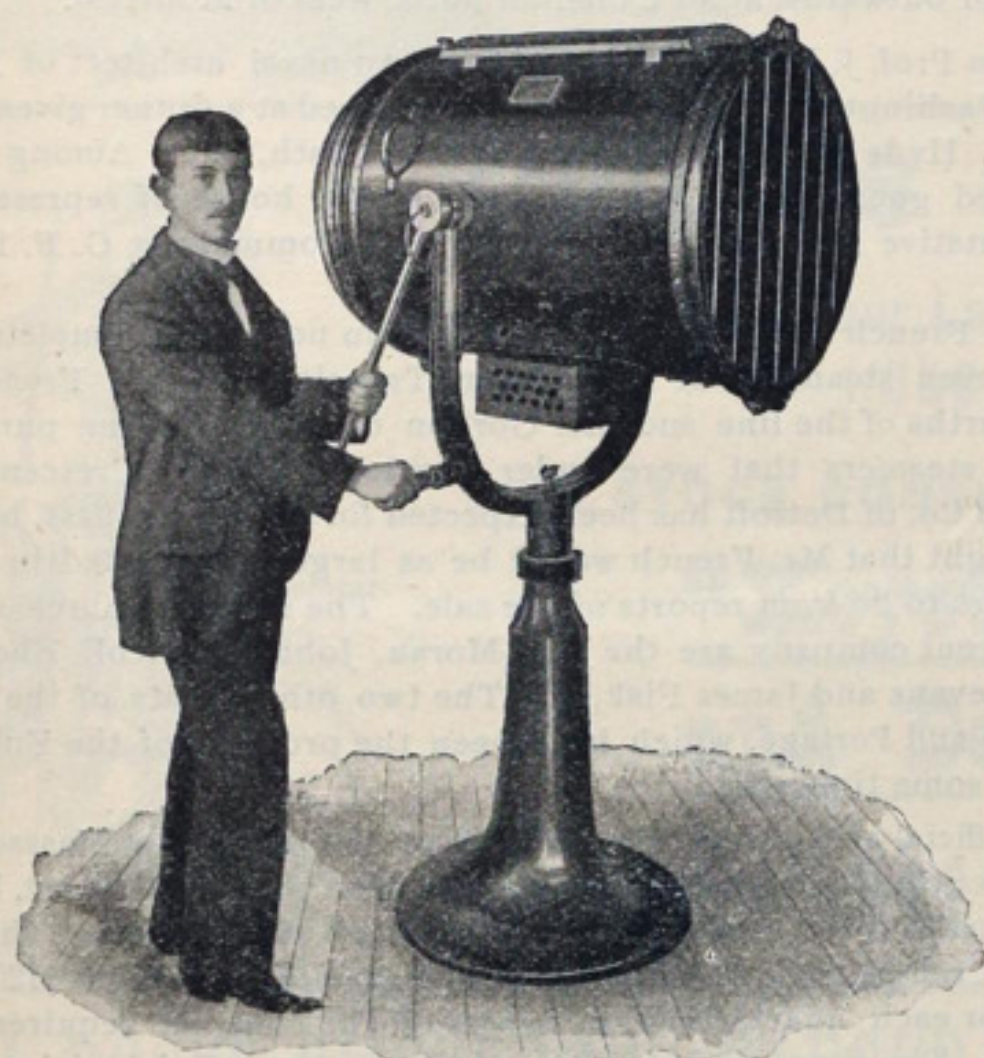


FIG. 1.

rear of the cylinder, as shown in figure 3, a large silvered lens, and a special focusing lamp lies in the case in the bottom of the cylinder, which is entirely empty except for the slender carbon holders which cast no shadow, and the carbons are so placed that all the light generated is thrown upon the mirror and is projected forward in a perfectly straight beam. This arrangement, which avoids all overheating, permits of the use of the most powerful current in the arc, and by recent tests in the navy it has been shown that the projected beam has an intensity of over 1,000,000 candles per ampere in the arc.

Figure 1 shows the plain projector as used in the navy and on large lake and ocean steamers. Figure 2 shows the pilot house light fitted

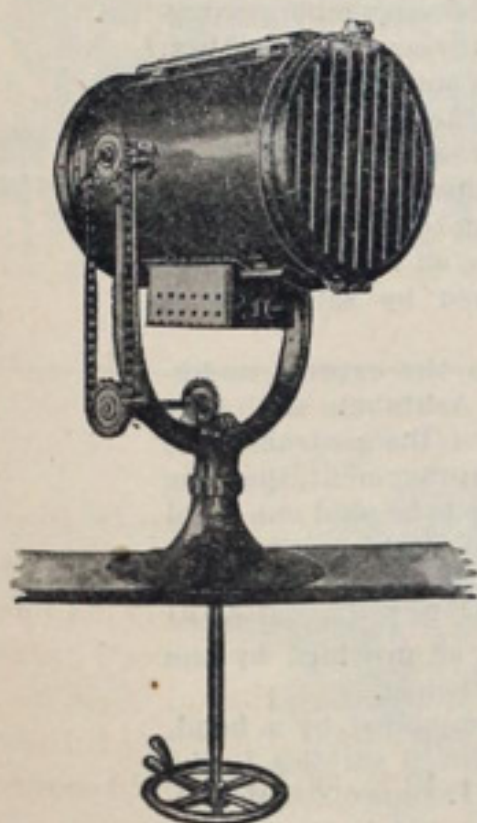


FIG. 2.

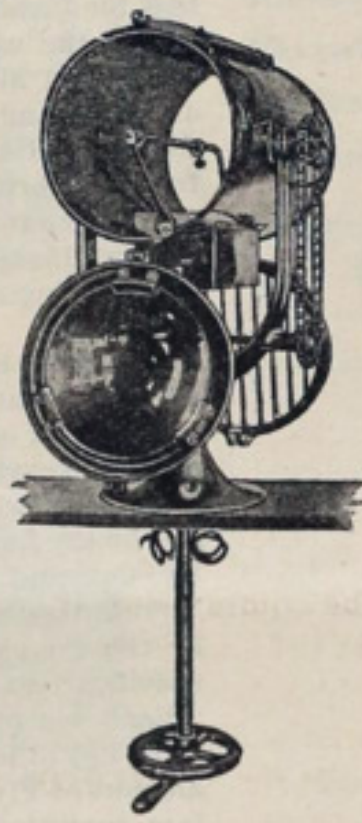


FIG. 3.

with a new controlling attachment for operating from within the pilot house. Figure 3 shows the small pilot house light, which is also extensively used on yachts, with front and back door open, showing the lens and lamp, from which it will be seen that it is easily cleaned and supplied with new carbons. The head letter in this article shows the new Rushmore aplanatic lens with reversed image. This new lens has the remark-

able property that by a slight movement it causes the narrow beam to be spread over a wide area, thus dispensing with the heavy and costly diverging lenses heretofore used in the navy.

Another type of this projector is fitted with a small motor in the base, so that the light may be placed at any point on the ship or on the mast head and the beam thrown in any direction by turning a lever of a small electric controller in the pilot house, thus doing away with all mechanical connections. These new projectors are designed for the roughest service and are free from all complications. Their power is said to be something wonderful and fully double that of the best French lights for the same current consumption, and they are fast replacing other makes. The Rushmore works has a complete lens-making plant, with which the cost of lenses has been reduced so that the best projectors may be sold at figures little higher than those that have prevailed on the old-style head lights.

Cargo and Speed Records—Lake Freight Steamers.

Notwithstanding the low stage of water that prevails on the lakes, it is probable that the cargo records of previous years will be broken early this season by the big ships now going into commission. It is announced already that one of the Minnesota company's new steel tow barges has taken to Buffalo from Chicago a cargo of about 156,000 bushels of corn, but as authentic figures regarding this cargo are not yet at hand it is not used in the statement that follows:

Iron ore—S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 4,569 gross or 5,117 net tons, Escanaba to South Chicago; Maritana, Minnesota Steamship Co. of Cleveland, 4,260 gross or 4,771 net tons, Escanaba to South Chicago; Selwyn Eddy, Eddy Bros of Bay City, Mich., 3,897 gross or 4,364 net tons, Escanaba to Ashtabula. Lake Superior cargoes—Schooner Aurania, John Corrigan of Cleveland, 3,928 gross or 4,399 net tons, Duluth to Ashtabula on 14 feet 4 inches draft; steamer Victory, Interlake Co. of Cleveland, 3,689 gross or 4,132 net tons, Two Harbors to Cleveland on draft of 14 feet 3 inches.

Grain—Selwyn Eddy, Eddy Transportation Co. of Bay City, 130,820 bushels of wheat, Detroit to Buffalo; Centurion, Hopkins Steamship Co. of St. Clair, Mich., 152,000 bushels of corn, Chicago to Buffalo; S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 246,673 bushels of oats, Chicago to Buffalo.

Coal—S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 4,535 net tons bituminous, Conneaut to Gladstone; Selwyn Eddy, Eddy Bros. of Bay City, Mich., 4,252 net tons anthracite, Buffalo to Milwaukee.

Speed—Owego, Union Line of Buffalo, Buffalo to Chicago, 889 miles, 45 hours and 16 minutes, 16.4 miles an hour; Centurion, Hopkins Steamship Co. of St. Clair, Mich., Buffalo to Duluth, 997 miles, 67 hours and 50 minutes, 14.7 miles an hour.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes on April 25, 1896:

	Wheat, bushels.	Corn, bushels.
Chicago.....	16,189,000	5,993,000
Duluth.....	14,686,000	147,000
Milwaukee.....	843,000	2,000
Detroit.....	216,000	17,000
Toledo.....	720,000	481,000
Buffalo.....	759,000	755,000
Total.....	33,413,000	7,395,000

As compared with a week ago, the above figures show at the several points named an increase of 369,000 bushels of wheat and 715,000 bushels of corn.

Great Railway and Steamship Combinations.

We have some very big railway and steamship corporations in this country but they do not compare very favorably with British lines operating in and out of London. There is no steamship and railway combination here that approaches in immensity the operations of the London & Southwestern company, which controls wharves, dry docks, etc., at Southampton. But the London & Northwestern R'y is even greater in its scope. This company has a capital of \$595,000,000 and a revenue of over \$6,500 an hour. Its 2,300 engines travel over forty-one million miles in the year. The company employs over 60,000 men and carries over 156,000 passengers a day. It makes everything it can for its own use, not only building its own bridges, engines and rolling its own rails, but making even the coal scuttles for its stations and the wooden limbs for the injured of its staff. Repairs on the line involve an expenditure of \$12,500 a day. The approach roads, the bridges and signals, and other necessities require \$700,000 a year to keep them in working order, and about \$500,000 a year goes in painting and repairing, besides \$150,000 in rebuilding. The wages bill for the permanent way alone amounts to \$130,000 a month.

Around the Lakes.

Duluth coal handlers are said to be preparing for a demand upon their employers next month for higher wages.

The new steamer W. D. Rees loaded 132,000 bushels of wheat at Duluth, Tuesday, on a mean draft of 13 feet 5½ inches.

Capt. McDougall has stated positively that the passenger whaleback Christopher Columbus will engage in excursion business again this season between Chicago and Milwaukee.

To the steamer Thomas Davidson belongs the credit of having completed the first round trip between Milwaukee and Buffalo the present season. The Davidson left Milwaukee on the morning of April 15 and returned on the morning of the 27th.

The steamer Iron Age, managed by Capt. James Millen of Detroit, has a cracked boiler. Capt. Millen proposes to have another of his steamers tow the Iron Age as a consort for the three or four weeks time that will be required to repair the boiler.

It is now thought that the new Lake Superior & Ishpeming Railway, which is to have docks at Presque Isle, near Marquette, will not be in readiness to ship ore before September. St. Ignace, which has been a memory, so far as actual shipping of ore is concerned, for some years, is to lose its last dock, the Duluth, South Shore & Atlantic having contracted with M. J. Peppard & Co. for the removal of the remaining 100-pocket dock now there and its replacement by a lumber dock.

It is probable that vessel owners of Cleveland, Buffalo and other lake cities, whose names were used as underwriters by Henry S. McFall, manager of the two Lloyd's companies that failed in Buffalo recently, will be subjected to a great deal of annoyance on account of suits brought against them by people having claims against the defunct concerns. In a suit begun by John Christian of Lyons, N. Y., a few days ago, papers were served on as many of these underwriters as could be located.

When railway men visit New York, where stock interests of their railways are at stake, they talk freely of business prospects. In an interview published by one of the papers of the metropolis, President A. G. Blair of the Wheeling & Lake Erie Ry. is reported as saying that his company has increased its car and locomotive equipment 20 per cent and yet has secured contracts already which will tax the capacity of these facilities to its limit. "Heretofore we have taken contracts for coal up to the middle of June," says Mr. Blair, "and sometimes we have sought business at a later date. This year we had contracted for nearly all the business we could handle on the 20th of April. Since that time we have had several large offers on terms which were attractive, but at present our capacity for shipments to the lakes this season is full. The fact that the demand has been so much earlier and stronger than usual shows that the consumers of coal see business ahead, which warrants their concluding arrangements to meet this demand. In other words, it is clear evidence of improvement in the general outlook for business."

Changes in Lights and Signals.

About April 30 a fixed red tubular lantern light will be established on the easterly end of the west breakwater entrance to Dunkirk harbor, Lake Erie, from which the former pierhead light structure was washed away in December last. The light will be visible from all points of approach from the lake.

Bearings given out by one of the officers of the steamer Santa Maria regarding the obstruction encountered by the schooner Teutonia of the Santa Maria's tow are evidently incorrect. Whatever the obstruction may be, it is certain that the bearings are worthless, as, for instance, a line W. ½ N. from Bar point light would run far up onto the Canadian shore.

Trade Notes.

Travel on the Long Island sound steamers, especially the Priscilla and Puritan, is said to already excel anything heretofore known.

Several valuable articles on boilers are contained in the "Penberthy Bulletin" for May. A copy of this little publication may be had upon application to the Penberthy Injector Co., Detroit.

Past National President Geo. P. Wilson of the Marine Engineers Beneficial Association, Philadelphia, is now with the Magnesia Sectional Covering Co., with headquarters at No. 382 Philadelphia Bourse.

The new U. S. harbor patrol boat Scout of New York is fitted with a Roberts boiler that has 60 feet grate surface. The vessel was designed by Lewis Nixon and built by John H. Dialogue & Son, Camden, N. J. She is of steel, 96 feet long, and has a compound engine, with cylinders of 14 and 29 inches diameter by 20 inches stroke. On a trial trip, a few days ago, the boiler was reported to have given an abundance of steam without forcing, and the steamer is said to have made 17 miles an hour with engines turning 184 revolutions.

In General.

In an extended illustrated article dealing with "Great Occasions of 1896" the Review of Reviews for May refers to the centennial celebration of the founding of Cleveland, which begins July 19.

It is said that a dry dock 800 feet long, the largest in the world, is to be built by the Newport News Ship Building & Dry Dock Co. The Newport News company certainly has great advantages in location, and its present large dock is heavily taxed with repair work.

A cargo steamer just completed by William Doxford & Sons, English builders of the turret type of ship, has a dead weight capacity of 11,375 gross tons. She is 465 by 58 by 35 feet and her load draft is 26 feet. Engines are triple expansion with cylinders 29, 50 and 80 inches diameter by 51 inches stroke.

A dispatch from Ottawa, Thursday, says that the Canadian government has decided upon an important change, in which American lake vessels will participate equally with Canadian vessels. An order in council has been passed abolishing the customs clearance fee, whether inwards or outwards, at all Canadian ports west of Montreal.

When Prof. J. Harvey Biles, well-known naval architect of England, was in Washington recently he was entertained at a dinner given by Gen. Thos. W. Hyde of the Bath Iron Works, Bath, Me. Among the distinguished guests were Speaker Reed of the house of representatives, Representative Boutelle, Senator Hale and Commander G. F. F. Wilde, U. S. N.

H. C. French and John Gordon of Buffalo now have complete control of the seven steamers of the Union Transit Co. Mr. French owns three-fourths of the line and Mr. Gordon one-fourth. The purchase of the five steamers that were under charter from the Crescent Transportation Co. of Detroit has been expected for some time past, but it was not thought that Mr. French would be as largely interested in them as he appears to be from reports of the sale. The steamers purchased from the Crescent company are the J. V. Moran, John M. Nicol, Eber Ward, W. H. Stevens and James Fisk, Jr. The two other boats of the line are the Avon and Portage, which have been the property of the Union company for some time past.

An official account of the trial trip of the battleship Massachusetts, which occurred on Saturday last, has not been published as yet, but it is understood that the vessel attained a speed of 16.279 knots. This would give the Cramps, Philadelphia builders, a premium of about \$125,000, or \$25,000 for each quarter knot in excess of the contract requirement of 15 knots. The time made by the Indiana on her official trial was 15.61 knots. The Massachusetts is equipped with an entire set of Blake pumps, including independent vertical twin air pumps for the main condensers, fire pumps, bilge pumps, water service pumps and feed pumps. The guns and turrets are also operated by means of Blake hydraulic pressure pumps, built especially for the purpose.

PROPOSALS FOR DREDGING.

Ashtabula, O., April 10, 1896. Sealed proposals will be received by The Lake Shore and Michigan Southern Ry. Co., The Pittsburgh, Youngstown and Ashtabula R. R. Co., operated by the Pennsylvania Co., and the City of Ashtabula, Ohio, at the office of the City Clerk for the said City of Ashtabula, at 12 m., Saturday, May 16, 1896, for furnishing the necessary labor, material and the use of the necessary dredges, tugs, scows and all other tools and appliances, for dredging and improving the river channel at Ashtabula Harbor, Ohio, from the north side of the swing bridge to the upper end of the docks on said channel, according to the maps, plans and specifications therefor, on file in the office of the Engineer employed by said City of Ashtabula.

Bids must be made with the express understanding that the City of Ashtabula shall only be liable for one-third (⅓) of the contract price of said excavation and improvement, that the remaining two-thirds (⅔) is to be paid one-third (1-3) by the Lake Shore and Michigan Southern Ry. Co., and one-third (1-3) by the Pittsburgh, Youngstown and Ashtabula R. R. Co., operated by the Pennsylvania Co., as provided by the specifications hereunto attached.

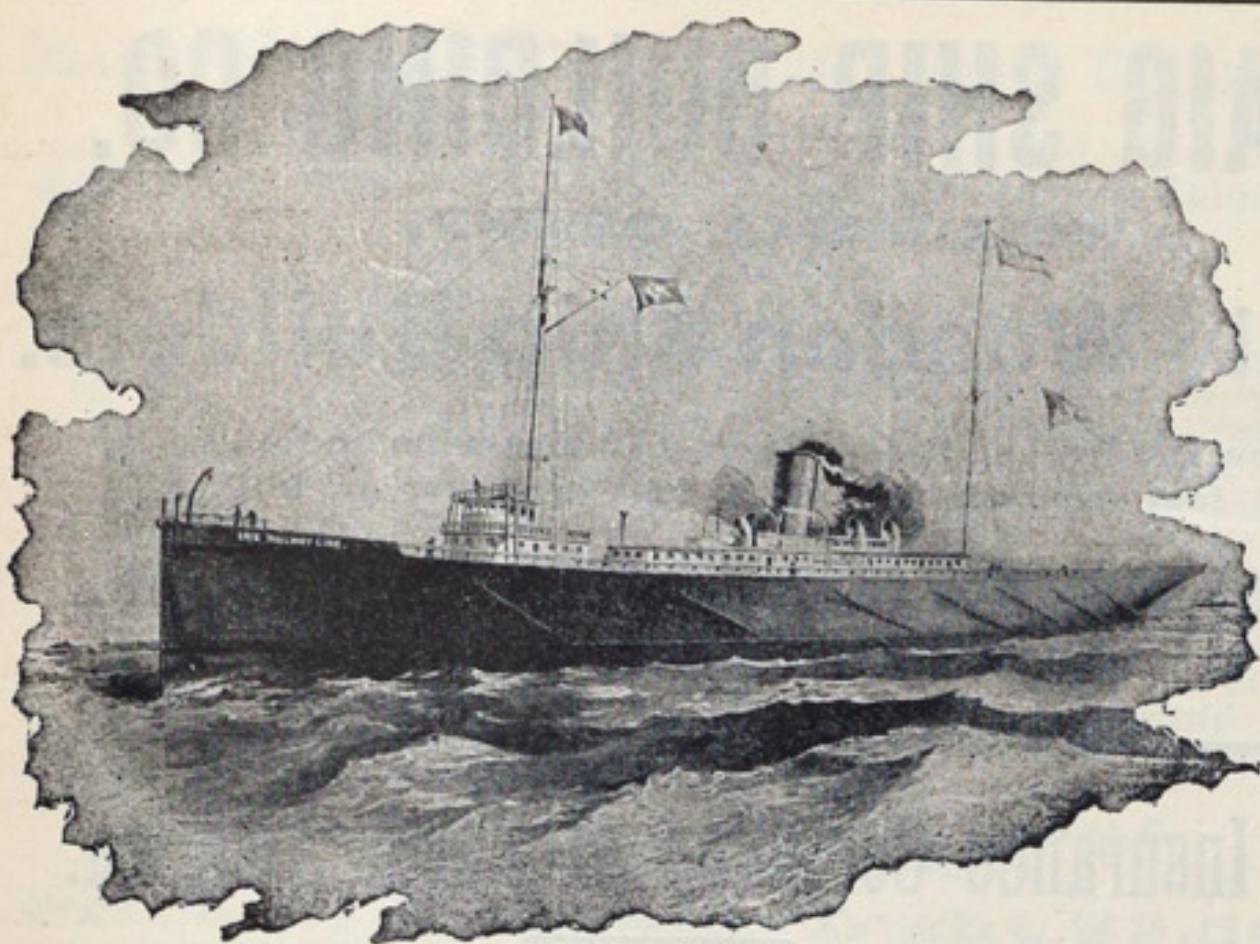
Each bid must be accompanied by a bond, signed by at least two approved sureties, in the amount of Five Thousand Dollars (\$5,000.00) Dollars, conditioned that if the bid is accepted, a contract will be entered into; and the performance of it properly secured.

Bidders are required to use the printed forms, which will be furnished on application at the Engineer's office.

The right is reserved to reject any or all bids, and to waive any informality.

By order of the Council.

A. B. PHILLIPS, City Clerk.



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OUR STOCK CONSISTS OF

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and Best Grades of Hocking Coals.**

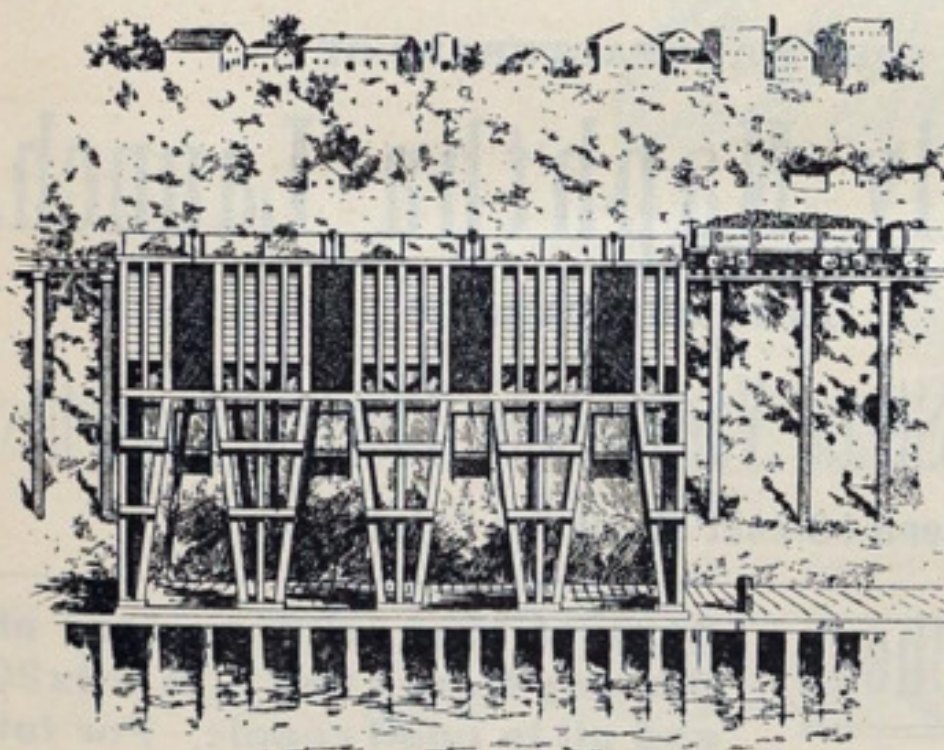
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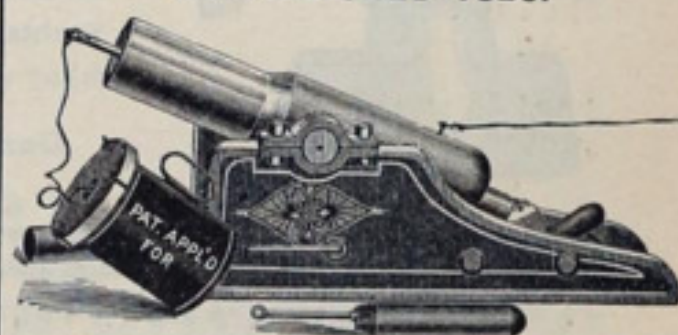
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"Leyland," "Atlantic Transport," and many
other steamship lines.

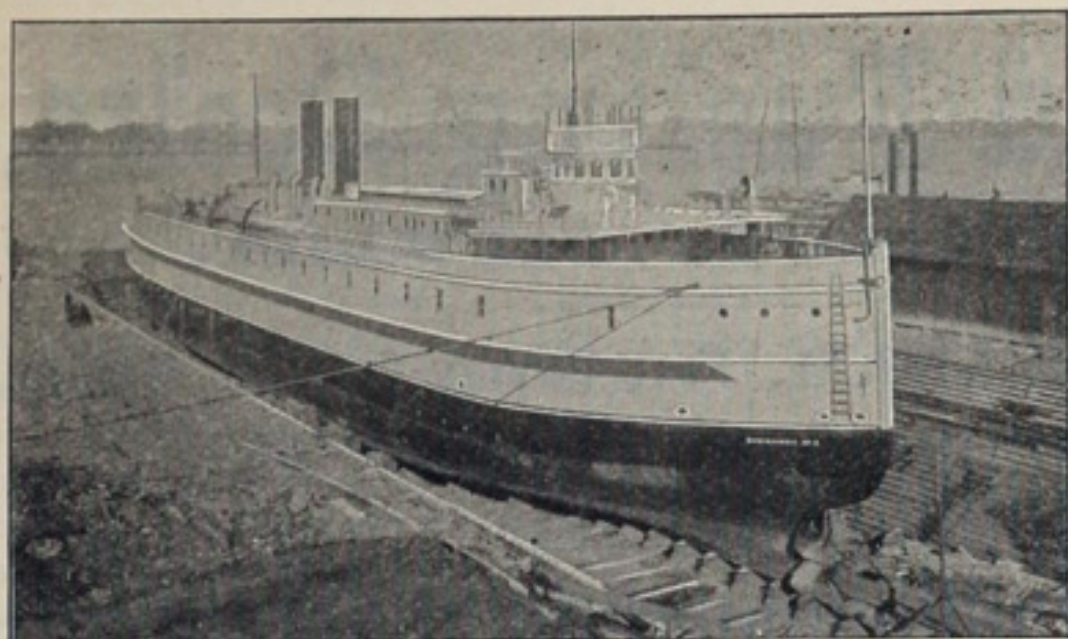
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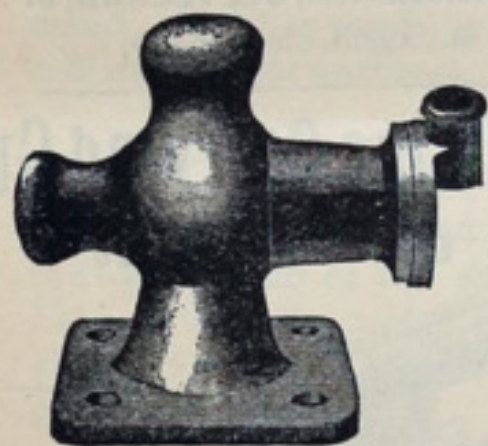
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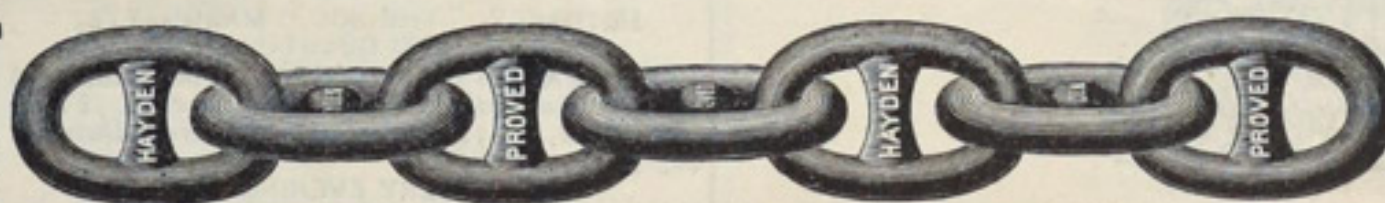
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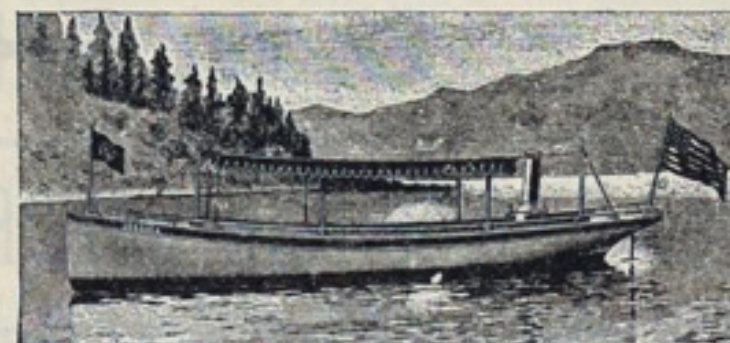
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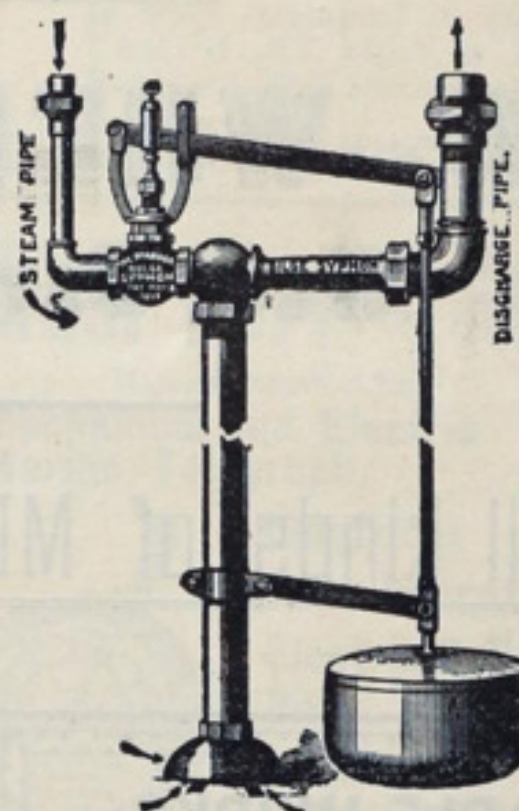
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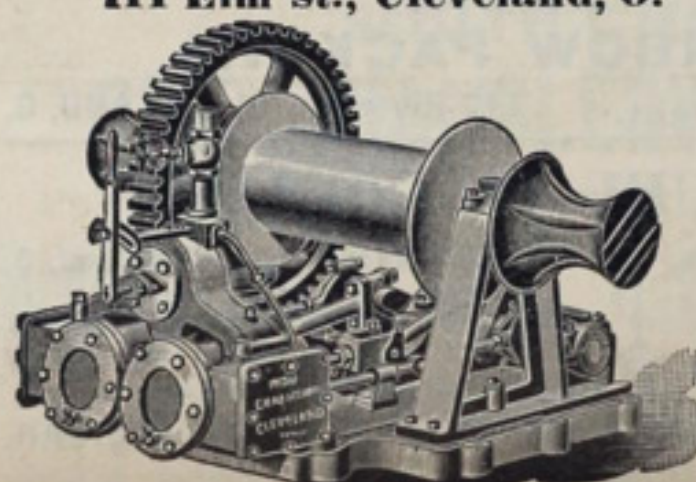
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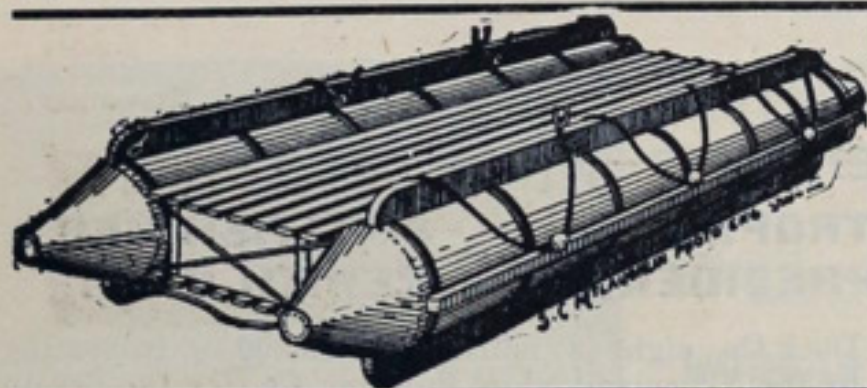
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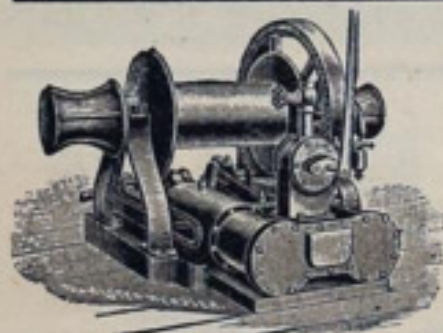
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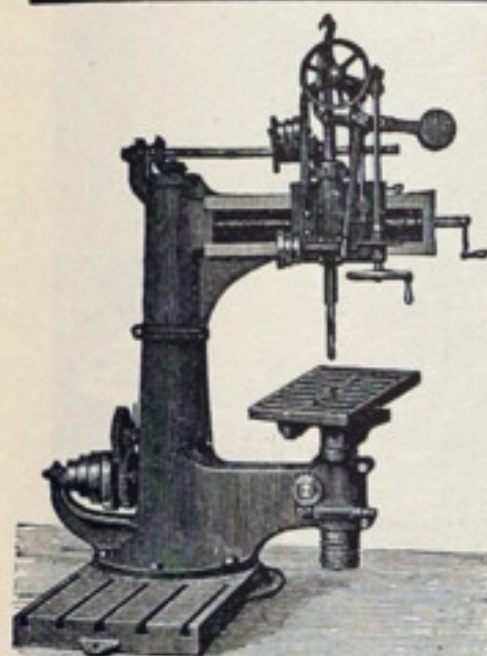
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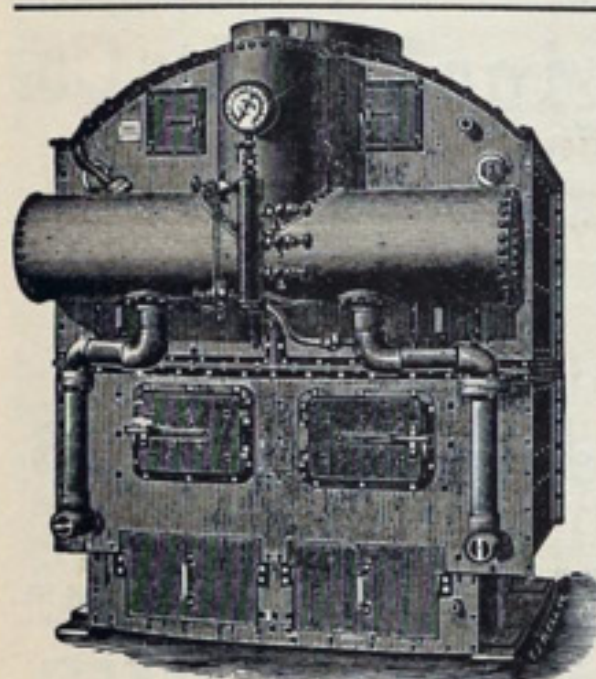
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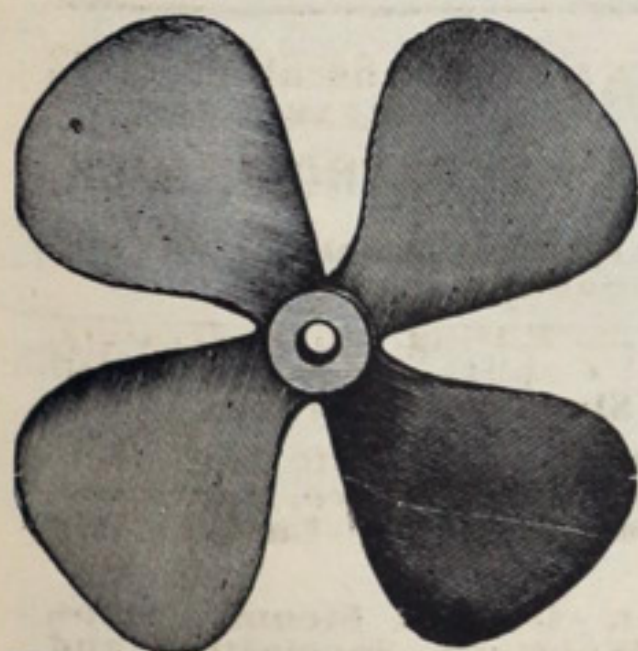
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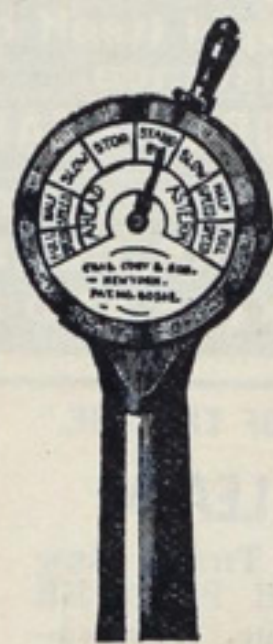
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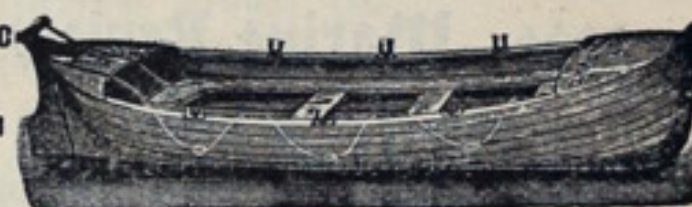
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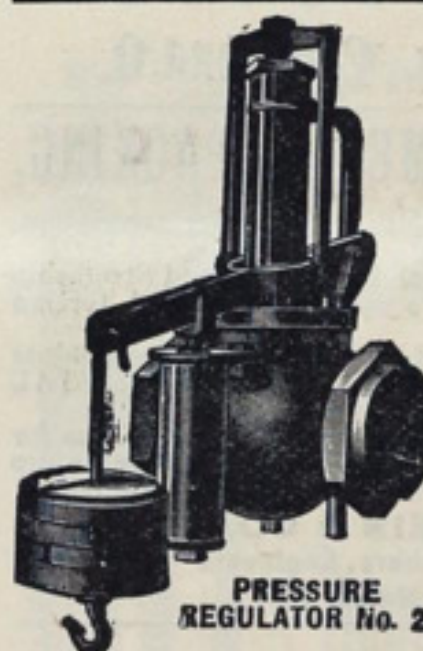
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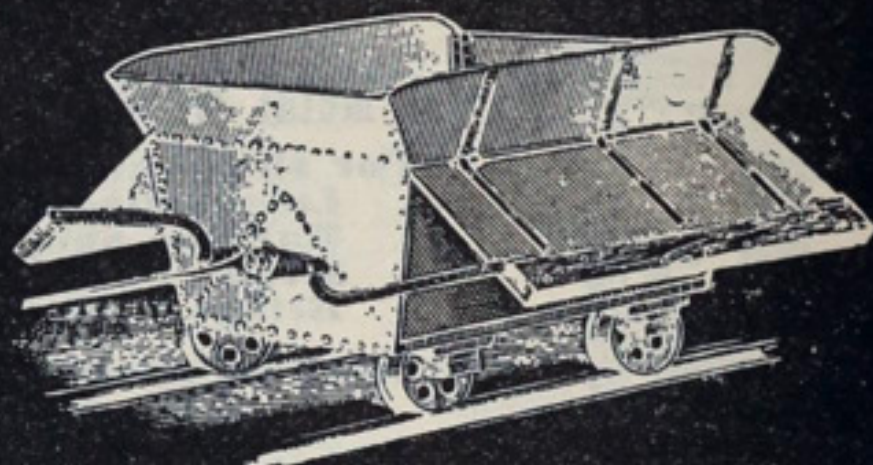
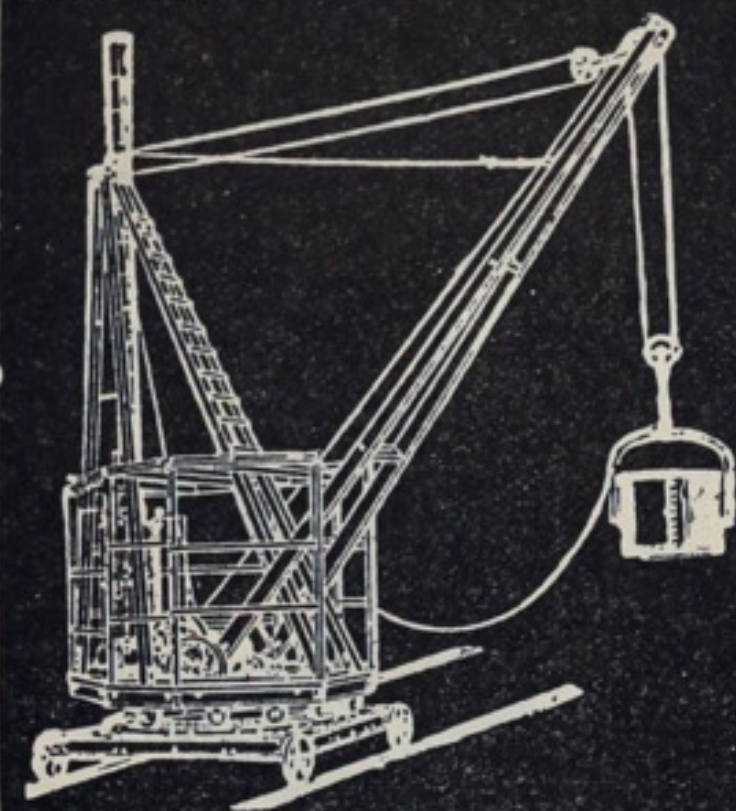
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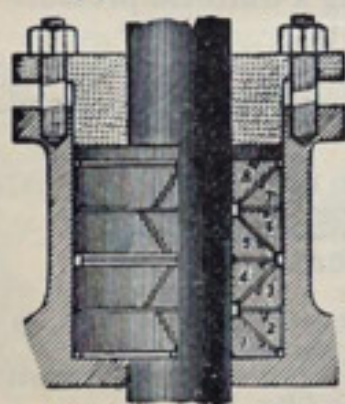
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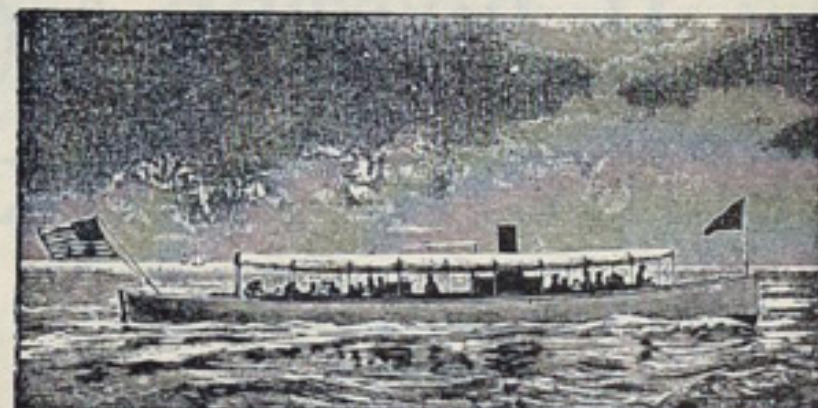
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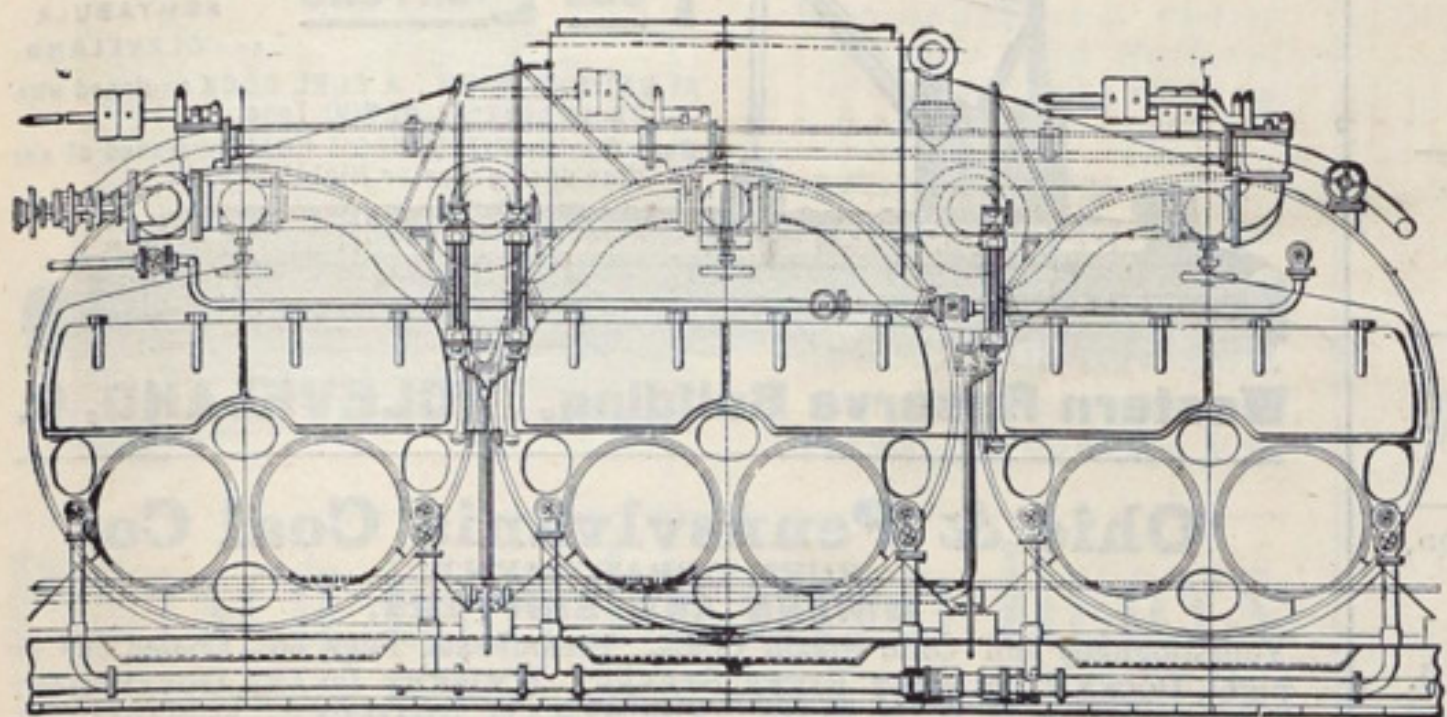
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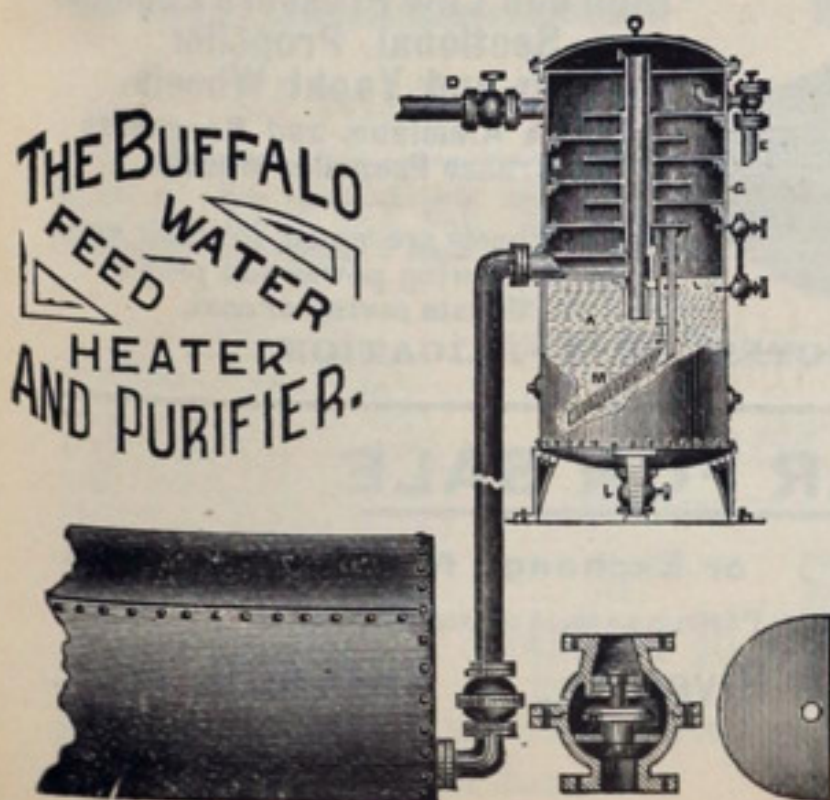
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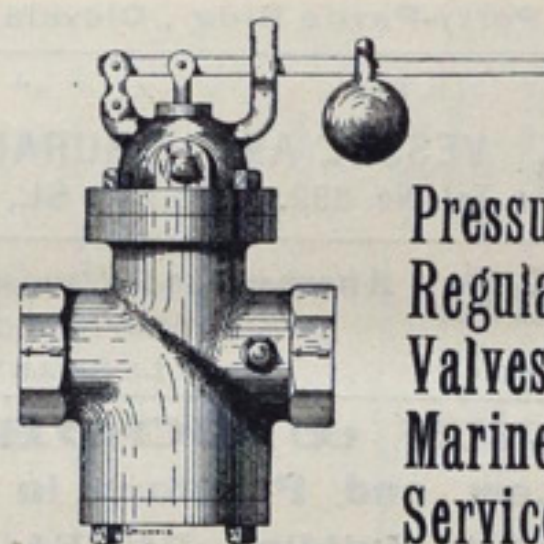
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- C.—Feed pipe to boiler.
- D.—Steam pipe.
- E.—Water supply pipe.
- F.—Check valve.
- G.—Spray disks.
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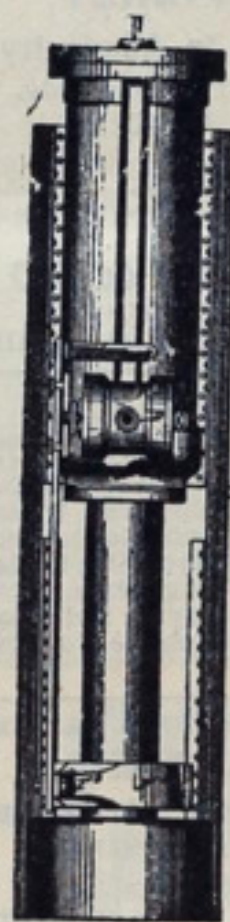
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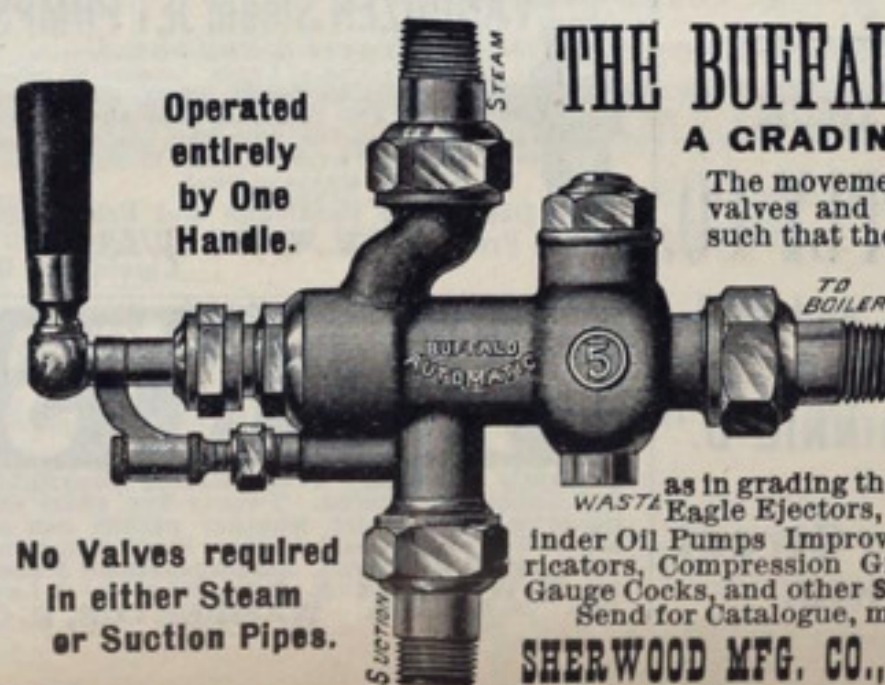
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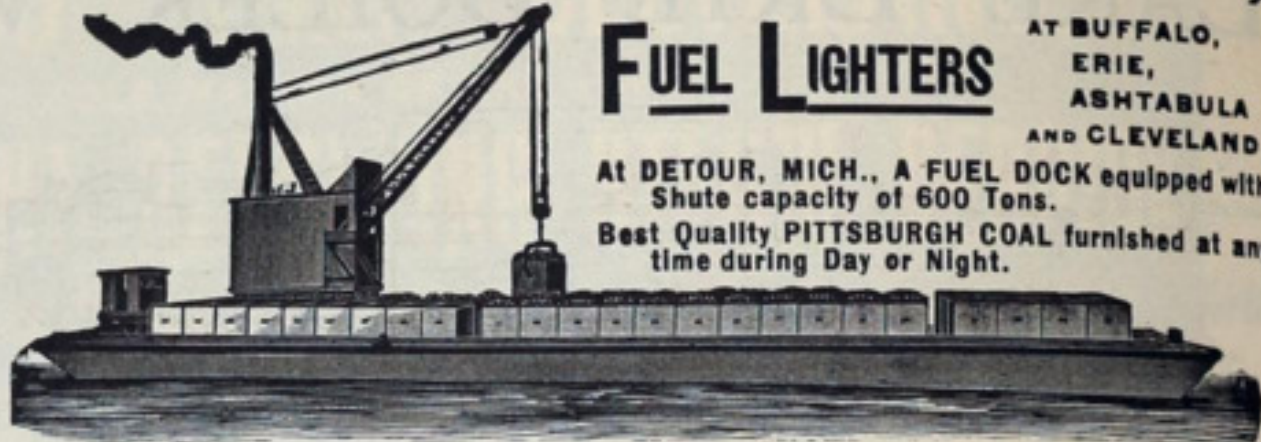
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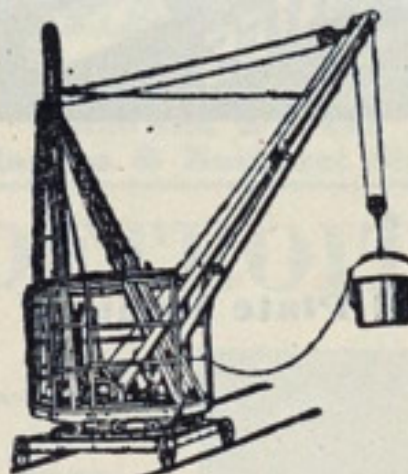
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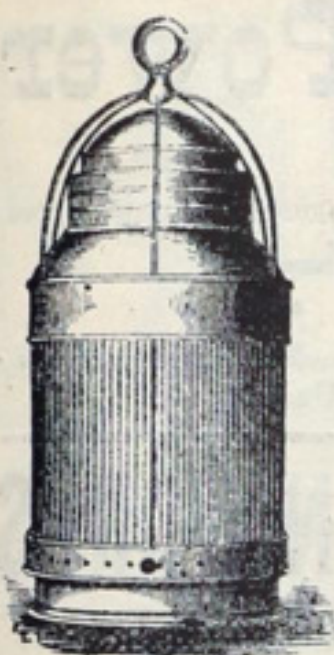
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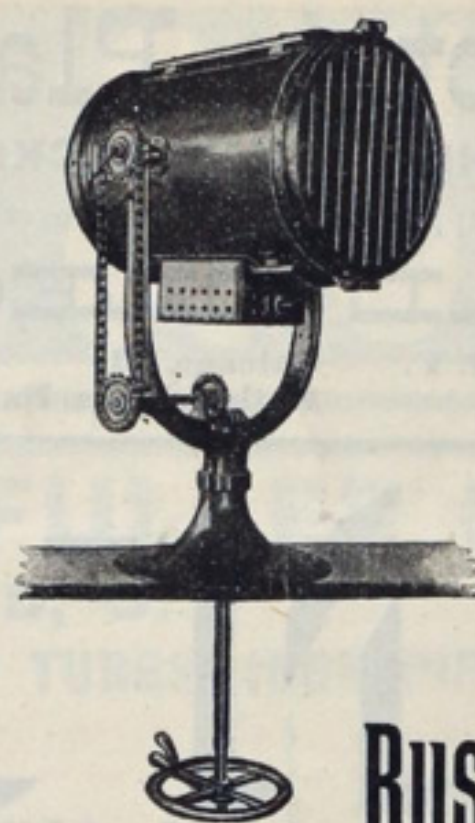
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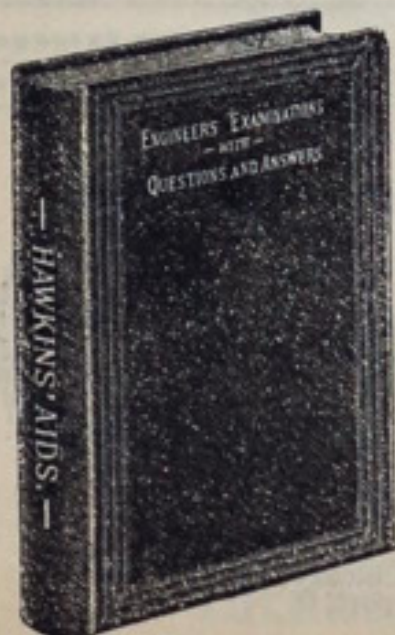
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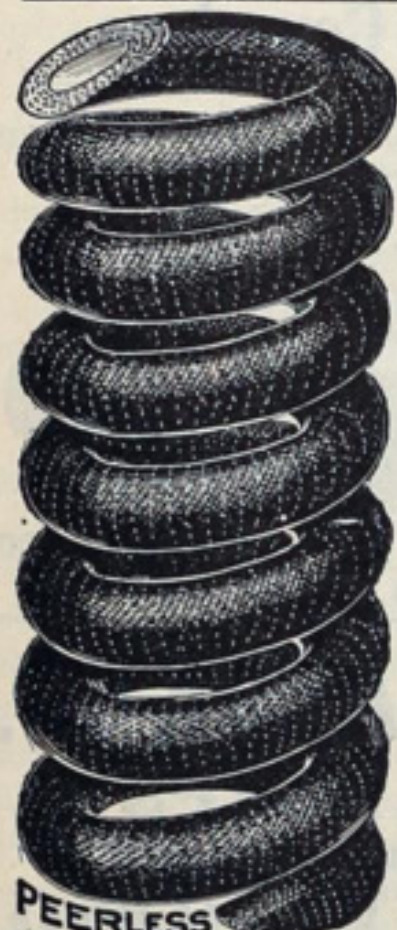
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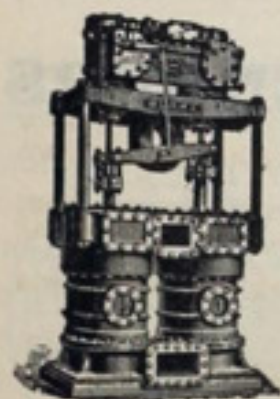
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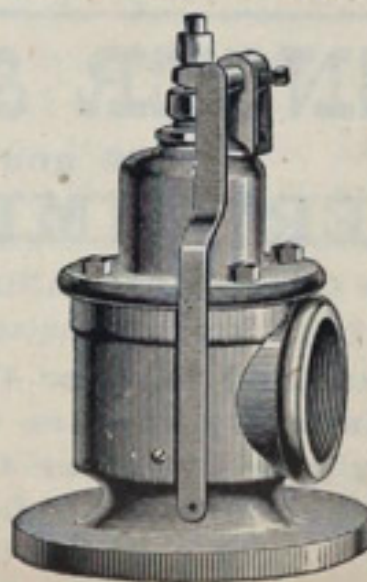
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ASBESTOS
MATERIALS
OF
ALL KINDS.

Wicking,
Fibre,
Mill Board,
Felt,
Packing,
Cement,
Liquid
Paints,
Roof Paints,
Fire-Proof,
Paints, etc.

Made in Sections Three Feet Long, to Fit
Every Size of Pipe.

ABSOLUTELY FIRE-PROOF.



THE CHASE MACHINE CO.

H. W. JOHNS MFG. CO.

111 ELM ST. CLEVELAND, O. 32 SOUTH WATER ST.

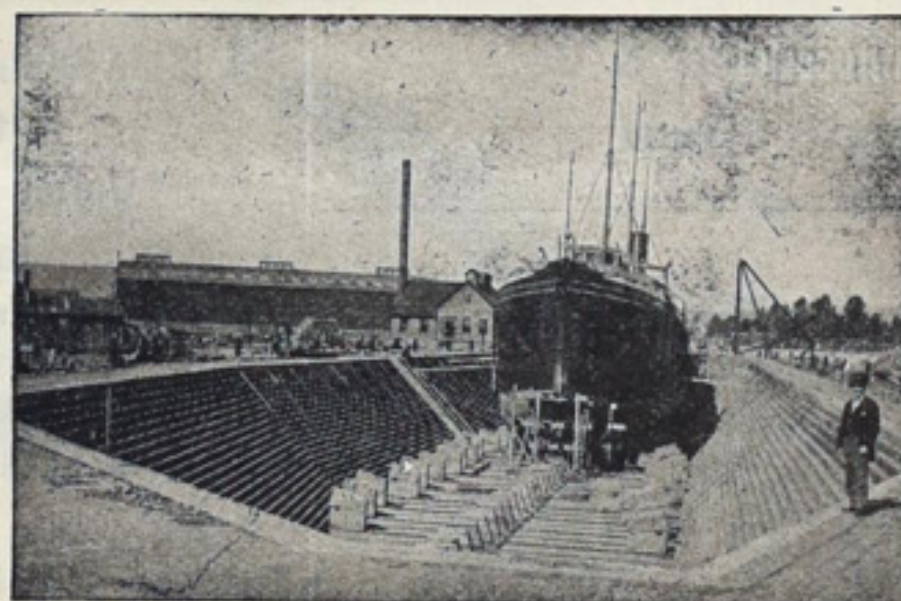
AMERICAN STEEL BARGE CO. STEEL and METAL SHIPS

Of all classes built on the Shortest Possible Notice at our yards at

West Superior, Wis., and also at Everett, Wash.

Photograph of 300 ft. Boat in Dock.

Plates &
Material
Always
on hand
to Re-
pair all
kinds of
Metal
Ships in
Shortest
Time.



Best
Quality
of Oak
instock
for Re-
pairing
Wooden
Vessels
of all
Classes.

SIZE OF DOCK.

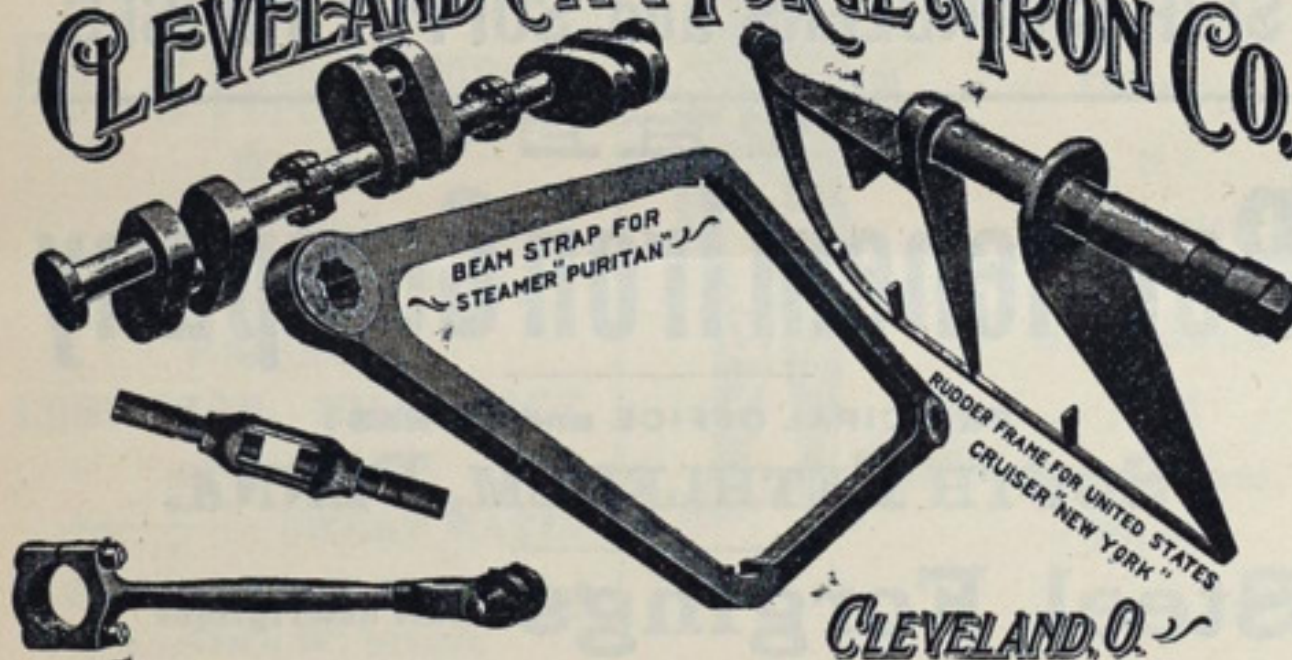
Length, extreme.....537 feet.	Entrance, Top.....55 feet 9 in.
Breadth, Top.....90 " 4 in.	Entrance, Bottom.....50 "
Breadth, Bottom.....52 "	Depth over Sills.....18 "

LARGEST DRY DOCK ON THE LAKES.

Prices for Repairs and Docking same as at lower lake ports
SUPERIOR, WIS.

A number of Propellor Wheels in stock at Dry Dock.

CLEVELAND CITY FORGE & IRON CO.



IRON OR STEEL FORGINGS FINISHED COMPLETE. ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT.
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.



ALKALI WATER PURIFIER!

A Pure Chemical for the safe Removal and Prevention of Scale in Steam Boilers. In use by many of the larger Steamship lines on the great Lakes. Guaranteed

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THE J. H. PARSONS CHEMICAL CO.,
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WHEELER CONDENSER & ENGINEERING COMPANY,

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WHEELER'S IMPROVED SURFACE CONDENSERS

MOUNTED UPON COMBINED AIR AND CIRCULATING PUMPS.

Sole Proprietors and Manufacturers of the

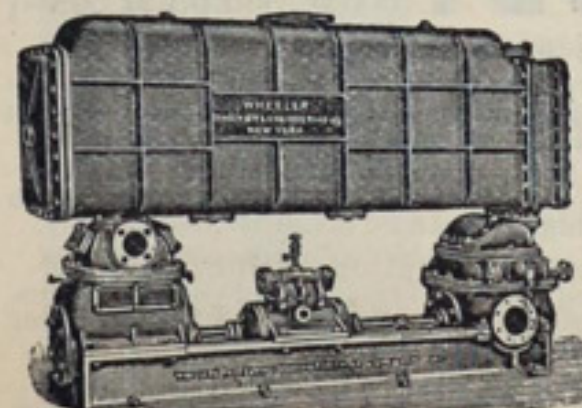
Wheeler Standard Surface Condenser.

Wheeler Admiralty Surface Condenser.

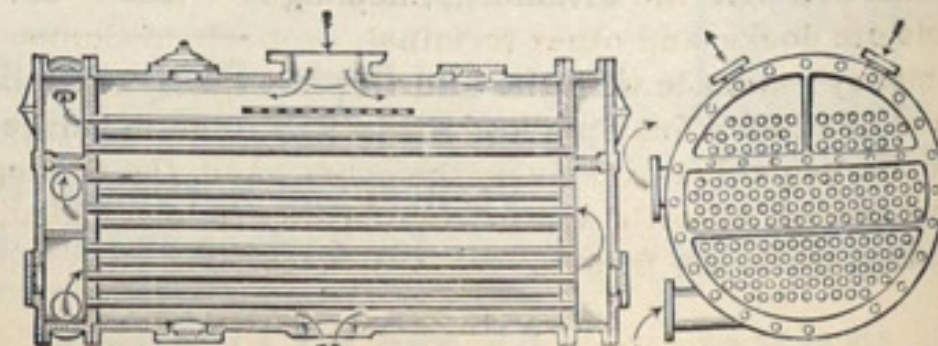
Wheeler Lighthall Surface Condenser.

Volz Patent Combined Surface Condenser
and Feed Water Heater.

Wheeler's Improved Marine Feed Water Heater.



Wheeler Surface Condenser.
Mounted on Combined Air & Circulat-
ing Pumps,



Patent Combined Surface Condenser & Feed-Water Heater.